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DIRECTIVE

635.1

ORIGINATING OFFICE:	SUBJECT:
Office of the Deputy Administrator National Program Staff	Humane Animal Care and Use
DISTRIBUTION: Headquarters, Areas, and Locations	

Removes AM 535 (6/1/77)

A REFERENCES

For additional information see DIRECTIVE 130.4, Animal Care and Use Committee.

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B SUMMARY

This Directive:

AUG 17 1995

- 1 States ARS Policy.
- 2 Lists coverage of animals under Public Laws, Policies and ARS practices. CATALOGING PREP.
- 3 Assigns responsibilities for assuring humane animal care and use.

C ABBREVIATIONS

AALAS	- American Association for Laboratory Animal Science
AD	- Area Director
AV	- Attending Veterinarian
AWA	- Animal Welfare Act
APHIS	- Animal and Plant Health Inspection Service, USDA
CFR	- Code of Federal Regulations
Ag Guide	- Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching
IACUC	- Institutional Animal Care and Use Committee
LERB	- Labor and Employee Relations Branch, Personnel Division, ARS
NIH Guide	- NIH Guide for the Care and Use of Laboratory Animals
NPS	- National Program Staff, ARS
OPRR	- Office for the Protection from Research Risks, NIH
PHS	- Public Health Service (Agencies of the PHS include the National Institutes of Health [NIH], Food and Drug Administration [FDA], Centers for Disease Control [CDC], and the Alcohol, Drug Abuse, and Mental Health Administration [ADAMHA]).
PL	- Public Law
REAC	- Regulatory Enforcement Animal Care, APHIS
RL	- Research Leader (ARS)
SY	- Research Scientist (ARS)
VS	- Veterinary Services, APHIS

D DEFINITION

Cooperator. As used in this Directive, taken to mean any non-ARS personnel caring for or using any vertebrate animal at an ARS Location.

E COVERAGE**1 ARS Policy:**

- a Includes: All vertebrate animals in all ARS Locations, or other locations in which ARS funds or ARS personnel are involved.
- b Excludes: Invertebrate animals.

2 AWA:

- a Includes: Any live or dead dog, cat, nonhuman primate, guinea pig, hamster, rabbit, or any other warmblooded animal, used or intended for use in research, teaching, testing, experimentation, or exhibition purposes, or as a pet.
- b Excludes: Birds, rats of the genus Rattus and mice of the genus Mus bred for use in research, and horses and other farm animals, such as, but not limited to livestock and poultry used or intended for use as food or fiber, or livestock or poultry used or intended for use for improving animal nutrition, breeding, management, or production efficiency, or for improving the quality of food or fiber.

3 PHS Policy:

- a Includes: Any animal (including farm animals) used in biomedical research and testing funded by a PHS Agency or in any institution that receives funds from a PHS Agency.
- b Excludes: Livestock and poultry used or intended for use that also is excluded from coverage by the AWA.

4 Ag Guide:

- a Includes: Livestock and poultry used in agricultural research and teaching.
- b Excludes: Animals covered by AWA or PHS.

F AUTHORITIES

- Laboratory Animal Welfare Act of 1966 as amended by the Animal Welfare Act of 1970, 1976 and 1985.
- 9 CFR 1, 2 (Subpart 2C), and 3.

F AUTHORITIES (Continued)

- U.S. PHS Policy on Humane Care and Use of Laboratory Animals, 1986 revision.
- NIH Guide for the Care and Use of Laboratory Animals, 1985 revision (NIH Publication No. 86-23).
- Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching, First Edition March, 1988.

G POLICY

It is ARS policy to assure that all ARS research animals are treated humanely. Allegations of animal abuse must be reported promptly, in writing, to the Chairperson, IACUC, and the AD. It is ARS Policy to assure that all ARS research facilities and other facilities using ARS animals, funds or personnel for any animal use comply with the following:

- 1 The AWA, for animals used in biomedical research, testing or teaching and covered by the AWA including:
 - a The AWA, its amendments, regulations, and standards concerning procurement, transportation, care, handling, and treatment of animals, training of personnel, and employee health programs (Exhibit 1).
 - b Requirement to maintain IACUCs in all ARS Locations that have animals covered by the AWA (except that ARS requires a minimum of five members whereas AWA requires a minimum of three). See also Directive 130.4, Animal Care and Use Committee.
 - c Assurance that animals not covered under the AWA receive the same level of humane animal care and treatment.
 - d Review, and, if warranted, investigate concerns involving care and use of animals resulting from complaints or reports of noncompliance.
- 2 PHS Policy, for ARS facilities receiving funds from any PHS agency including:
 - a PHS Policy and also the NIH Guide concerning procurement, transportation, care, handling, and treatment of animals, training of personnel, and employee health programs (Exhibit 2).
 - b Maintain IACUCs that comply with PHS Policy in all ARS Locations that use animals. Note that ARS and PHS Policy concerning IACUC size and composition are identical. See also Directive 130.4, Animal Care and Use Committee.

G POLICY (Continued)

- c Assurance that animals not covered under PHS Policy receive the same level of humane animal care and treatment.
- 3 Ag Guide, for ARS facilities or facilities receiving ARS funds and using farm animals for any purpose with the following stipulations:

Ag Guide chapters 5-11 outlining appropriate husbandry practices for various species of farm animals (Exhibit 3).

H LICENSING AND REGISTRATION

- 1 Not required for Federal agencies under the AWA.
- 2 Filing of an annual PHS Assurance with OPRR/NIH is required for all ARS Locations that receive funds from any PHS agency. Many other public and private funding entities also require filing of a PHS Assurance as a condition of grant/contract completion.

I RESPONSIBILITIES

- 1 The Administrator, where applicable, through the NPS, assures compliance with AWA, PHS Policy and NIH Guide, Ag Guide, and ARS Policy concerning humane care and use of all vertebrate animals.
- 2 AD's assure:
 - a IACUCs are established where required and maintained in operation.
 - b IACUC members and Chairpeople are appointed and function according to Directive 130.4, Animal Care and Use Committee.
 - c That all employees who work with animals are appropriately trained.
 - d Regulations, standards, and policies are enforced.
 - e Reporting requirements for AWA, PHS Policy (where applicable), and ARS are met in a timely manner.
 - f Deficiencies, including those involving physical facilities, are corrected promptly.

I RESPONSIBILITIES (Continued)

- g Procurement of all vertebrate animals in Areas/Centers/Locations is covered by an IACUC approval for the stipulated number of animals.
- h Consultation to IACUC, Attending Veterinarians, and/or other employees concerning animal care and welfare is provided.
- i That upon request of APHIS representatives, information required under the AWA is furnished.
- j That, if needed, assistance is requested from APHIS and/or OPRR/NIH concerning attainment of policy goals.
- k Funds and time are provided for employees to receive training required under the AWA.
- l Reported noncompliances with ARS Policy, the AWA and/or PHS Policy are investigated promptly and resolved.
- m That prompt disciplinary action is taken regarding any employee or cooperator found to have abused animals.

3 Area/Center/Location Procurement Officer and Area/Center/Location Property Officer will assure that all orders for acquisition and disposition of all vertebrate animals comply with the AWA and ARS Directives concerning approved sources, and assurance that appropriate documentation accompanies all acquisitions and dispositions of animals.

4 RLs/SYs assure:

- a Acquisition of all animals comply with the AWA and ARS Policy.
- b Recordkeeping complies with the AWA, including the special recordkeeping required for dogs and cats that is described in Subpart 2C, Section 2.35.
- c Compliance with all special requirements concerning dogs and cats (Directive 130.4, Animal Care and Use Committee) that are delegated to RLs/SYs.
- d Dogs and cats obtained from sources other than dealers, exhibitors, and exempt persons are held for at least 5 full days before they are used.
- e All animals held or used for any purpose are covered by IACUC approval.

I RESPONSIBILITIES (Continued)

- f Recordkeeping provisions of the AWA, Subpart 2C, Section 2.35 concerning dogs and cats are followed and forms/records are forwarded to the appropriate Area IACUC (the official Area Record).
- g They personally, as well as their technicians, caretakers, students, and others are aware of and follow regulations and standards for humane care of animals used in any manner by them and/or their subordinates.
- h Any inadequacies in care, handling, or environmental conditions concerning animals are promptly reported and corrected.
- i Maintenance of training on regulatory requirements and humane care and use of animals.
- j Disposition of all healthy surplus animals comply with ARS property disposal procedures for disposition of surplus government animals. In addition, disposition of all dogs and cats also must comply with the AWA concerning recordkeeping (Subpart 2C, Section 2.35), euthanasia, sale, or transportation.

5 Attending Veterinarian:

- a Serves on the IACUC
- b Assures that:
 - (1) All vertebrate animals receive adequate veterinary care in compliance with the AWA, NIH Guide, and Ag Guide.
 - (2) Guidance is provided to appropriate research and care personnel concerning, including but not limited to, care and use of animals regarding humane handling, immobilization, anesthesia, analgesia, euthanasia, tranquilization, as well as pre- and post-procedural care in accordance with established veterinary and nursing procedures and the AWA.
 - (3) VS Form 18-23 covering the previous fiscal year ending September 30 is accurately completed, receives concurrence by IACUC, and forwarded to AD for transmission to REAC/APHIS and NPS/ARS in a timely manner.
 - (4) ARS Form 605 covering the previous fiscal year ending September 30 is accurately completed, receives concurrence by IACUC, and forwarded to AD for transmission to NPS/ARS in a timely manner.

I RESPONSIBILITIES (Continued)

- (5) Animal caretakers receive an adequate level of training to provide optimum care of animals.
- (6) Chairperson, IACUC, RL, Center Director, and AD are promptly notified about all failures to comply with provisions of AWA, NIH Guide, and Ag Guide concerning regulations and standards.
- (7) Knowledge of new veterinary medical developments and regulatory requirements is maintained through a continuing program of training.

6 Consulting Veterinarian assume same responsibilities as attending veterinarian.

7 Animal Caretakers assure:

- a All animals under their responsibility receive care consistent with the AWA, NIH Guide, and Ag Guide on a daily basis, except for free ranging animals where Location IACUCs set the appropriate frequency.
- b All management and environmental requirements for animals are met in a timely manner.
- c Maintenance of current knowledge of all aspects of care for the species in their charge through a continuing program of training.
- d That during the first year of employment as animal caretaker, they take a course leading to certification given by AALAS (for laboratory animal caretakers) or by another organization/institution (for caretakers of species for which AALAS training is inappropriate). This course must contain training in current animal care practices and regulatory requirements relevant to the species in use. Lists of appropriate training courses leading to employee certification may be obtained from the IACUC. Employee certifications will be updated periodically to assure that they reflect current animal care practices, regulatory requirements, and relevance to the species being cared for.
- e On or before the first year of employment as animal caretaker, receive certification in the appropriate training course (described in H.7.d above). Failure to meet the certification requirement within a year after entering on duty will be grounds for dismissal.

I RESPONSIBILITIES (Continued)

8 IACUCs will fulfill all of the requirements in Directive 130.4, Animal Care and Use Committee.



R. D. PLOWMAN
Administrator

Exhibits

- 1 Animal Welfare Act, 9 CFR Parts 1, 2C, and 3
- 1A Amendment to 9 CFR Part 3 (Animal Welfare: Guinea Pigs; Hamsters; and Rabbits)
- 2 Humane Animal Care and Use
 - 2a PHS Policy on Human Care and Use of Laboratory Animals, revised 1986
 - 2b NIH Guide for the Care, Use of Laboratory Animals, revised 1985
- 3 Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (Chapters 5-11)

SUBCHAPTER A—ANIMAL WELFARE**PART 1—DEFINITION OF TERMS**

AUTHORITY: 7 U.S.C. 2131-2157; 7 CFR 2.11, 2.51, and 371.2(g).

§ 1.1 Definitions.

For the purposes of this subchapter, unless the context otherwise requires, the following terms shall have the meanings assigned to them in this section. The singular form shall also signify the plural, and the masculine form shall also signify the feminine. Words undefined in the following paragraphs shall have the meaning attributed to them in general usage as reflected by definitions in a standard dictionary.

Act means the Act of August 24, 1966 (Pub. L. 89-544), commonly known as the Laboratory Animal Welfare Act, as amended by the Act of December 24, 1970 (Pub. L. 91-579), the Animal Welfare Act of 1970, the Act of April 22, 1976 (Pub. L. 94-279), (the Animal Welfare Act of 1976), and the Act of December 23, 1985 (Pub. L. 99-198), (the Food Security Act of 1985), and as it may be subsequently amended.

Activity means, for purposes of part 2, subpart C of this subchapter, those elements of research, testing, or teaching procedures that involve the care and use of animals.

Administrative unit means the organizational or management unit at the departmental level of a research facility.

Administrator means the Administrator of the Animal and Plant Health Inspection Service, U.S. Department of Agriculture, or any other official of the Animal and Plant Health Inspection Service to whom authority has been delegated to act in his stead.

Ambient temperature means the air temperature surrounding the animal.

Animal means any live or dead dog, cat, nonhuman primate, guinea pig, hamster, rabbit, or any other warm-blooded animal, which is being used, or is intended for use for research, teaching, testing, experimentation, or exhibition purposes, or as a pet. This term excludes: Birds, rats of the genus

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animals at a facility subject to the jurisdiction of the Secretary.

Business hours means a reasonable number of hours between 7 a.m. and 7 p.m., Monday through Friday, except for legal Federal holidays, each week of the year, during which inspections by APHIS may be made.

Business year means the 12-month period during which business is conducted, and may be either on a calendar or fiscal-year basis.

Carrier means the operator of any airline, railroad, motor carrier, shipping line, or other enterprise which is engaged in the business of transporting any animals for hire.

Cat means any live or dead cat (*Felis catus*) or any cat-hybrid cross.

Class "A" licensee (breeder) means a person subject to the licensing requirements under part 2 and meeting the definition of a "dealer" (§ 1.1), and whose business involving animals consists only of animals that are bred and raised on the premises in a closed or stable colony and those animals acquired for the sole purpose of maintaining or enhancing the breeding colony.

Class "B" licensee means a person subject to the licensing requirements under part 2 and meeting the definition of a "dealer" (§ 1.1), and whose business includes the purchase and/or resale of any animal. This term includes brokers, and operators of an auction sale, as such individuals negotiate or arrange for the purchase, sale, or transport of animals in commerce. Such individuals do not usually take actual physical possession or control of the animals, and do not usually hold animals in any facilities. A class "B" licensee may also exhibit animals as a minor part of the business.

Class "C" licensee (exhibitor) means a person subject to the licensing requirements under part 2 and meeting the definition of an "exhibitor" (§ 1.1), and whose business involves the showing or displaying of animals to the public. A class "C" licensee may buy and sell animals as a minor part of the business in order to maintain or add to his animal collection.

Commerce means trade, traffic, transportation, or other commerce:

(1) Between a place in a State and any place outside of such State, including any foreign country, or between points within the same State but through any place outside thereof, or within any territory, possession, or the District of Columbia; or

(2) Which affects the commerce described in this part.

Committee means the Institutional Animal Care and Use Committee (IACUC) established under section 13(b) of the Act. It shall consist of at least three (3) members, one of whom is the attending veterinarian of the research facility and one of whom is not affiliated in any way with the facility other than as a member of the committee, however, if the research facility has more than one Doctor of Veterinary Medicine (DVM), another DVM with delegated program responsibility may serve. The research facility shall establish the Committee for the purpose of evaluating the care, treatment, housing, and use of animals, and for certifying compliance with the Act by the research facility.

Dealer means any person who, in commerce, for compensation or profit, delivers for transportation, or transports, except as a carrier, buys, or sells, or negotiates the purchase or sale of: Any dog or other animal whether alive or dead (including unborn animals, organs, limbs, blood, serum, or other parts) for research, teaching, testing, experimentation, exhibition, or for use as a pet; or any dog for hunting, security, or breeding purposes. This term does not include: A retail pet store, as defined in this section, unless such store sells any animals to a research facility, an exhibitor, or a dealer (wholesale); or any person who does not sell, or negotiate the purchase or sale of any wild or exotic animal, dog, or cat and who derives no more than \$500 gross income from the sale of animals other than wild or exotic animals, dogs, or cats.

Department means the U.S. Department of Agriculture.

Deputy Administrator means the Deputy Administrator for Regulatory Enforcement and Animal Care (REAC) or any other official of REAC

9 CFR Parts 1, 2 (Subpart C), and 3**Part 1 - Animal Welfare; Definition of Terms****Part 2 (Subpart C) - Research Facilities****Part 3 - Standards**

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to whom authority has been delegated to act in his stead.

Dog means any live or dead dog (*Canis familiaris*) or any dog-hybrid cross.

Dwarf hamster means any species of hamster such as the Chinese and Armenian species whose adult body size is substantially less than that attained by the Syrian or Golden species of hamsters.

Endangered species means those species defined in the Endangered Species Act (16 U.S.C. 1531 et seq.) and as it may be subsequently amended.

Euthanasia means the humane destruction of an animal accomplished by a method that produces rapid unconsciousness and subsequent death without evidence of pain or distress, or a method that utilizes anesthesia produced by an agent that causes painless loss of consciousness and subsequent death.

Exhibitor means any person (public or private) exhibiting any animals, which were purchased in commerce or the intended distribution of which affects commerce, or will affect commerce, to the public for compensation, as determined by the Secretary. This term includes carnivals, circuses, animal acts, zoos, and educational exhibits, exhibiting such animals whether operated for profit or not. This term excludes retail pet stores, horse and dog races, organizations sponsoring and all persons participating in State and county fairs, livestock shows, rodeos, field trials, coursing events, purebred dog and cat shows and any other fairs or exhibitions intended to advance agricultural arts and sciences as may be determined by the Secretary.

Exotic animal means any animal not identified in the definition of "animal" provided in this part that is native to a foreign country or of foreign origin or character, is not native to the United States, or was introduced from abroad. This term specifically includes animals such as, but not limited to, lions, tigers, leopards, elephants, camels, antelopes, anteaters, kangaroos, and water buffalo, and species of foreign domestic cattle, such as Ankole, Gayal, and Yak.

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Farm animal means any domestic species of cattle, sheep, swine, goats, llamas, or horses, which are normally and have historically, been kept and raised on farms in the United States, and used or intended for use as food or fiber, or for improving animal nutrition, breeding, management, or production efficiency, or for improving the quality of food or fiber. This term also includes animals such as rabbits, mink, and chinchilla, when they are used solely for purposes of meat or fur, and animals such as horses and llamas when used solely as work and pack animals.

Federal agency means an Executive agency as such term is defined in section 105 of title 5, United States Code, and with respect to any research facility means the agency from which the research facility receives a Federal award for the conduct of research, experimentation, or testing involving the use of animals.

Federal award means any mechanism (including a grant, award, loan, contract, or cooperative agreement) under which Federal funds are used to support the conduct of research, experimentation, or testing, involving the use of animals. The permit system established under the authorities of the Endangered Species Act, the Marine Mammal Protection Act, and the Migratory Bird Treaty Act, are not considered to be Federal awards under the Animal Welfare Act.

Federal research facility means each department, agency, or instrumentality of the United States which uses live animals for research or experimentation.

Field study means any study conducted on free-living wild animals in their natural habitat, which does not involve an invasive procedure, and which does not harm or materially alter the behavior of the animals under study.

Handling means petting, feeding, watering, cleaning, manipulating, loading, crating, shifting, transferring, immobilizing, restraining, treating, training, working and moving, or any similar activity with respect to any animal.

Housing facility means any land, premises, shed, barn, building, trailer,

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or other structure or area housing or intended to house animals.

Hybrid cross means an animal resulting from the crossbreeding between two different species or types of animals. Crosses between wild animal species, such as lions and tigers, are considered to be wild animals. Crosses between wild animal species and domestic animals, such as dogs and wolves or buffalo and domestic cattle, are considered to be domestic animals.

Impervious surface means a surface that does not permit the absorption of fluids. Such surfaces are those that can be thoroughly and repeatedly cleaned and disinfected, will not retain odors, and from which fluids bead up and run off or can be removed without their being absorbed into the surface material.

Indoor housing facility means any structure or building with environmental controls housing or intended to house animals and meeting the following three requirements:

(1) It must be capable of controlling the temperature within the building or structure within the limits set forth for that species of animal, of maintaining humidity levels of 30 to 70 percent and of rapidly eliminating odors from within the building; and

(2) It must be an enclosure created by the continuous connection of a roof, floor, and walls (a shed or barn set on top of the ground does not have a continuous connection between the walls and the ground unless a foundation and floor are provided); and

(3) It must have at least one door for entry and exit that can be opened and closed (any windows or openings which provide natural light must be covered with natural light material such as glass or hard plastic).

Intermediate handler means any person, including a department, agency, or instrumentality of the United States or of any State or local government (other than a dealer, research facility, exhibitor, any person excluded from the definition of a dealer, research facility, or exhibitor, an operator of an auction sale, or a carrier), who is engaged in any business in which he receives custody of animals in connection with their transportation in commerce.

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Inspector means any person employed by the Department who is authorized to perform a function under the Act and the regulations in 9 CFR parts 1, 2, and 3.

Institutional official means the individual at a research facility who is authorized to legally commit on behalf of the research facility that the requirements of 9 CFR parts 1, 2, and 3 will be met.

Isolation in regard to marine mammals means the physical separation of animals to prevent contact and a separate, noncommon, water circulation and filtration system for the isolated animals.

Licensed veterinarian means a person who has graduated from an accredited school of veterinary medicine or has received equivalent formal education as determined by the Administrator, and who has a valid license to practice veterinary medicine in some State.

Licensee means any person licensed according to the provisions of the Act and the regulations in part 2 of this subchapter.

Major operative procedure means any surgical intervention that penetrates and exposes a body cavity or any procedure which produces permanent impairment of physical or physiological functions.

Minimum horizontal dimension (MHD) means the diameter of a circular pool of water, or in the case of a square, rectangle, oblong, or other shape pool, the diameter of the largest circle that can be inserted within the confines of such a pool of water.

Mobile or traveling housing facility means a transporting vehicle such as a truck, trailer, or railway car, used to house animals while traveling for exhibition or public education purposes.

Nonconditioned animals means animals which have not been subjected to special care and treatment for sufficient time to stabilize, and where necessary, to improve their health.

Nonhuman primate means any non-human member of the highest order

of mammals, including prostrimates, monkeys, and apes.

Operator of an auction sale means any person who is engaged in operat-

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ing an auction at which animals are purchased or sold in commerce.

Outdoor housing facility means any structure, building, land, or premise, housing or intended to house animals, which does not meet the definition of any other type of housing facility provided in the regulations, and in which temperatures cannot be controlled within set limits.

Painful procedure as applied to any animal means any procedure that would reasonably be expected to cause more than slight or momentary pain or distress in a human being to which that procedure was applied, that is, pain in excess of that caused by injections or other minor procedures.

Paralytic drug means a drug which causes partial or complete loss of muscle contraction and which has no anesthetic or analgesic properties, so that the animal cannot move, but is completely aware of its surroundings and can feel pain.

Person means any individual, partnership, firm, joint stock company, corporation, association, trust, estate, or other legal entity.

Pet animal means any animal that has commonly been kept as a pet in family households in the United States, such as dogs, cats, guinea pigs, rabbits, and hamsters. This term excludes exotic animals and wild animals.

Positive physical contact means petting, stroking, or other touching which is beneficial to the well-being of the animal.

Primary conveyance means the main method of transportation used to convey an animal from origin to destination, such as a motor vehicle, plane, ship, or train.

Primary enclosure means any structure or device used to restrict an animal or animals to a limited amount of space, such as a room, pen, run, cage, compartment, pool, hutch, or tether. In the case of animals restrained by a tether (e.g., dogs on chains), it includes the shelter and the area within reach of the tether.

Principal investigator means an employee of a research facility or other person associated with a research facility, responsible for a proposal to conduct research and for the design

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and implementation of research involving animals.

Quorum means a majority of the Committee members.

Random source means dogs and cats obtained from animal pounds or shelters, auction sales, or from any person who did not breed and raise them on his or her premises.

Registrant means any research facility, carrier, intermediate handler, or exhibitor not required to be licensed under section 3 of the Act, registered pursuant to the provisions of the Act and the regulations in part 2 of this subchapter.

Research facility means any school (except an elementary or secondary school), institution, organization, or person that uses or intends to use live animals in research, tests, or experiments, and that (1) purchases or transports live animals in commerce, or (2) receives funds under a grant, award, loan, or contract from a department, agency, or instrumentality of the United States for the purpose of carrying out research, tests, or experiments; *Provided*, That the Administrator may exempt, by regulation, any such school, institution, organization, or person that does not use or intend to use live dogs or cats, except those schools, institutions, organizations, or persons, which use substantial numbers (as determined by the Administrator) of live animals the principal function of which schools, institutions, organizations, or persons, is biomedical research or testing, when in the judgment of the Administrator, any such exemption does not vitiate the purpose of the Act.

Retail pet store means any outlet where only the following animals are sold or offered for sale, at retail, for use as pets: Dogs, cats, rabbits, guinea pigs, hamsters, gerbils, rats, mice, go-chucks, chinchilla, domestic ferrets, domestic farm animals, birds, and cold-blooded species. Such definition excludes—

(1) Establishments or persons who deal in dogs used for hunting, security, or breeding purposes;

(2) Establishments or persons exhibiting, selling, or offering to exhibit or sell any wild or exotic or other nonpet warmblooded animals

(except birds), such as skunks, raccoons, nonhuman primates, squirrels, ocelots, foxes, coyotes, etc.

(3) Any establishment or person selling warmblooded animals (except birds, and laboratory rats and mice) for research or exhibition purposes; and

(4) Any establishment wholesaling any animals (except birds, rats and mice).

(5) Any establishment exhibiting pet animals in a room that is separate from or adjacent to the retail pet store, or in an outside area, or anywhere off the retail pet store premises.

Sanitize means to make physically clean and to remove and destroy, to the maximum degree that is practical, agents injurious to health.

Secretary means the Secretary of Agriculture of the United States or his representative who shall be an employee of the Department.

Sheltered housing facility means a housing facility which provides the animals with shelter; protection from the elements; and protection from temperature extremes at all times. A sheltered housing facility may consist of runs or pens totally enclosed in a barn or building, or of connecting inside/outside runs or pens with the inside pens in a totally enclosed building.

Standards means the requirements with respect to the humane housing, exhibition, handling, care, treatment, temperature, and transportation of animals by dealers, exhibitors, research facilities, carriers, intermediate handlers, and operators of auction sales as set forth in part 3 of this subchapter.

State means a State of the United States, the District of Columbia, Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, or any other territory or possession of the United States.

Study area means any building room, area, enclosure, or other confinement outside of a core facility or centrally designated or managed area in which animals are housed for more than 12 hours.

Transporting device means an interim vehicle or device, other than man, used to transport an animal between the primary conveyance and the ter-

rninal facility or in and around the terminal facility of a carrier or intermediate handler.

Transporting vehicle means any truck, car, trailer, airplane, ship, or railroad car used for transporting animals.

Weaned means that an animal has become accustomed to take solid food and has so done, without nursing, for a period of at least 5 days.

Wild animal means any animal which is now or historically has been found in the wild, or in the wild state, within the boundaries of the United States, its territories, or possessions. This term includes, but is not limited to, animals such as: Deer, skunk, opossum, raccoon, mink, armadillo, coyote, squirrel, fox, wolf.

Wild state means living in its original, natural condition; not domesticated.

Zoo means any park, building, cage, enclosure, or other structure or premise in which a live animal or animals are kept for public exhibition or viewing, regardless of compensation.

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PART 2—REGULATIONS**Subpart A—Licensing**

Sec. 2.1 Requirements and application.

2.2 Acknowledgement of regulations and standards.

2.3 Demonstration of compliance with regulations and standards.

2.4 Non-interference with APHIS officials.

2.5 Duration of license and termination of license.

2.6 Annual license fees.

2.7 Annual report by licensees.

2.8 Notification of change of name, address, control, or ownership of business.

2.9 Officers, agents, and employees of licensees whose licenses have been suspended or revoked.

2.10 Licensees whose licenses have been suspended or revoked.

2.11 Denial of initial license application.

Subpart B—Registration

2.25 Requirements and procedures.

2.26 Acknowledgement of regulations and standards.

2.27 Notification of change of operation.

§ 2.30**Subpart B—Registration****§ 2.25 Requirements and procedures.**

(a) Each carrier and intermediate handler, and each exhibitor not required to be licensed under section 3 of the Act and the regulations of this subchapter, shall register with the Secretary by completing and filing a properly executed form which will be furnished, upon request, by the APHIS, REAC Sector Supervisor. The registration form shall be filed with the APHIS, REAC Sector Supervisor for the State in which the registrant has his or her principal place of business, and shall be updated every 3 years by the completion and filing of a new registration form which will be provided by the APHIS, REAC Sector Supervisor.

(b) A subsidiary of a business corporation, rather than the parent corporation, will be registered as an exhibitor unless the subsidiary is under such direct control of the parent corporation that the Secretary determines that it is necessary that the parent corporation be registered to effectuate the purposes of the Act.

§ 2.26 Acknowledgment of regulations and standards.

APHIS will supply a copy of the regulations and standards in this subchapter with each registration form. The registrant shall acknowledge receipt of and shall agree to comply with the regulations and standards by signing a form provided by APHIS, and by filing it with the APHIS, REAC Sector Supervisor.

§ 2.27 Notification of change of operation.

(a) A registrant shall notify the APHIS, REAC Sector Supervisor by certified mail of any change in the name, address, or ownership, or other change in operations affecting its status as an exhibitor, carrier, or intermediate handler, within 10 days after making such change.

(b)(1) A registrant which has not used, handled, or transported animals for a period of at least 2 years may be placed in an inactive status by making a written request to the APHIS, REAC Sector Supervisor. A registrant shall notify the APHIS, REAC Sector Su-

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pervisor in writing at least 10 days before using, handling, or transporting animals again after being in an inactive status.

(2) A registrant which goes out of business or which ceases to function as a carrier, intermediate handler, or exhibitor, or which changes its method of operation so that it no longer uses, handles, or transports animals, and which does not plan to use, handle, or transport animals again at any time in the future, may have its registration canceled by the APHIS, REAC Sector Supervisor by making a written request to the APHIS, REAC Sector Supervisor.

Subpart C—Research Facilities**§ 2.30 Registration.**

(a) Requirements and procedures. (1) Each research facility other than a Federal research facility, shall register with the Secretary by completing and filing a properly executed form which will be furnished, upon request, by the APHIS, REAC Sector Supervisor. The registration form shall be filed with the APHIS, REAC Sector Supervisor for the State in which the research facility has its principal place of business, and shall be updated every 3 years by the completion and filing of a new registration form which will be provided by the APHIS, REAC Sector Supervisor. Except as provided in paragraph (a)(2) of this section, where a school or department of a university or college uses or intends to use live animals for research, tests experiments, or teaching, the university or college rather than the school or department will be considered the research facility and will be required to register with the Secretary. An official who has the legal authority to bind the parent organization shall sign the registration form.

(2) In any situation in which a school or department of a university or college demonstrates to the Secretary that it is a separate legal entity and its operations and administration

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are independent of those of the university or college, the school or department will be registered rather than the university or college.

(3) A subsidiary of a business corporation, rather than the parent corporation, will be registered as a research facility unless the subsidiary is under such direct control of the parent corporation that the Secretary determines that it is necessary that the parent corporation be registered to effectuate the purposes of the Act.

(b) Acknowledgment of regulations and standards. APHIS will supply a copy of the regulations and standards in this subchapter with each registration form. The research facility shall acknowledge receipt of and shall agree to comply with the regulations and standards by signing a form provided for this purpose by APHIS, and by filing it with the APHIS, REAC Sector Supervisor.

(c) Notification of change of operation.

(1) A research facility shall notify the APHIS, REAC Sector Supervisor by certified mail of any change in the name, address, or ownership, or other change in operations affecting its status as a research facility, within 10 days after making such change.

(2) A research facility which has not used, handled, or transported animals for a period of at least 2 years may be placed in an inactive status by making a written request to the APHIS, REAC Sector Supervisor. A research facility shall file an annual report of its status (active or inactive). A research facility shall notify the APHIS, REAC Sector Supervisor in writing at least 10 days before using, handling, or transporting animals again after being in an inactive status.

(3) A research facility which goes out of business or which ceases to function as a research facility, or which changes its method of operation so that it no longer uses, handles, or transports animals, and which does not plan to use, handle, or transport animals at any time in the future, may have its registration canceled by making a written request to the APHIS, REAC Sector Supervisor. The research facility is responsible for registering and demonstrating its com-

pliance with the Act and regulations should it start using, handling, or transporting animals at any time after its registration is canceled.

§ 2.31 Institutional Animal Care and Use Committee (IACUC).

(a) The Chief Executive Officer of the research facility shall appoint an Institutional Animal Care and Use Committee (IACUC), qualified through the experience and expertise of its members to assess the research facility's animal program, facilities, and procedures. Except as specifically authorized by law or these regulations, nothing in this part shall be deemed to permit the Committee or IACUC to prescribe methods or set standards for the design, performance, or conduct of actual research or experimentation by a research facility.

(b) IACUC Membership. (1) The members of each Committee shall be appointed by the Chief Executive Officer of the research facility. (2) The Committee shall be composed of a Chairman and at least two additional members;

(3) Of the members of the Committee:

(i) At least one shall be a Doctor of Veterinary Medicine, with training or experience in laboratory animal science and medicine, who has direct or delegated program responsibility for activities involving animals at the research facility;

(ii) At least one shall not be affiliated with the facility other than as a member of the Committee, and shall not be a member of the immediate family of a person who is affiliated with the facility. The Secretary intends that such person will provide representation for general community interests in the proper care and treatment of animals;

(4) If the Committee consists of more than three members, not more than three members shall be from the same administrative unit of the facility.

(c) IACUC Functions. With respect to activities involving animals, the IACUC, as an agent of the research facility, shall:

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(1) Review, at least once every six months, the research facility's program for humane care and use of animals, using title 9, chapter I, subchapter A—Animal Welfare, as a basis for evaluation;

(2) Inspect, at least once every six months, all of the research facility's animal facilities, including animal study areas, using title 9, chapter I, subchapter A—Animal Welfare, as a basis for evaluation; *Provided, however, That animal areas containing free-living wild animals in their natural habitat need not be included in such inspection.*

(3) Prepare reports of its evaluations conducted as required by paragraphs (c) (1) and (2) of this section, and submit the reports to the Institutional Official of the research facility; *Provided, however, That the IACUC may determine the best means of conducting evaluations of the research facility's programs and facilities; and Provided, further, That no Committee member wishing to participate in any evaluation conducted under this subpart may be excluded.* The IACUC may use subcommittees composed of at least two Committee members and may invite *ad hoc* consultants to assist in conducting the evaluations; however, the IACUC remains responsible for the evaluations and reports as required by the Act and regulations. The reports shall be reviewed and signed by a majority of the IACUC members and must include any minority views. The reports shall be updated at least once every six months upon completion of the required semiannual evaluations and copying upon request. The reports must contain a description of the nature and extent of the research facility's adherence to this subchapter, must identify specifically any departures from the provisions of title 9, chapter I, subchapter A—Animal Welfare, and must state the reasons for each departure. The reports must distinguish significant deficiencies from minor deficiencies. A significant deficiency is one which, with reference to Subchapter A, and, in the judgment of

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significant changes in ongoing activities meet the following requirements:

(1) Procedures involving animals will avoid or minimize discomfort, distress, and pain to the animals;

(2) The principal investigator has considered alternatives to procedures that may cause more than momentary or slight pain or distress to the animals, and has provided a written narrative description of the methods and sources, e.g., the Animal Welfare Information Center, used to determine that alternatives were not available;

(iii) The principal investigator has provided written assurance that the activities do not unnecessarily duplicate previous experiments;

(iv) Procedures that may cause more than momentary or slight pain or distress to the animals will:

(A) Be performed with appropriate sedatives, analgesics or anesthetics, unless withholding such agents is justified for scientific reasons, in writing, by the principal investigator and will continue for only the necessary period of time;

(B) Involve, in their planning, consultation with the attending veterinarian or his or her designee;

(C) Not include the use of paralytics without anesthesia;

(v) Animals that would otherwise experience severe or chronic pain or distress that cannot be relieved will be painlessly euthanized at the end of the procedure or, if appropriate, during the procedure;

(vi) The animals' living conditions will be appropriate for their species in accordance with part 3 of this subchapter, and contribute to their health and comfort. The housing, feeding, and nonmedical care of the animals will be directed by the attending veterinarian or other scientist trained and experienced in the proper care, handling, and use of the species being maintained or studied;

(vii) Medical care for animals will be available and provided as necessary by a qualified veterinarian;

(viii) Personnel conducting procedures on the species being maintained or studied will be appropriately qualified and trained in those procedures;

(ix) Activities that involve surgery include appropriate provision for pre-

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(4) Review, and, if warranted, investigate concerns involving the care and use of animals at the research facility resulting from public complaints received and from reports of noncompliance received from laboratory or research facility personnel or employees;

(5) Make recommendations to the Institutional Official regarding any aspect of the research facility's animal program, facilities, or personnel training;

(6) Review and approve, require modifications in (to secure approval), or withhold approval of those components of proposed activities related to the care and use of animals, as specified in paragraph (d) of this section;

(7) Review and approve, require modifications in (to secure approval), or withhold approval of proposed significant changes regarding the care and use of animals in ongoing activities; and

(8) Be authorized to suspend an activity involving animals in accordance with the specifications set forth in paragraph (d)(6) of this section.

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operative and post-operative care of the animals in accordance with established veterinary medical and nursing practices. All survival surgery will be performed using aseptic procedures, including surgical gloves, masks, sterile instruments, and aseptic techniques. Major operative procedures on non-rodents will be conducted only in facilities intended for that purpose which shall be operated and maintained under aseptic conditions. Non-major operative procedures and all surgery on rodents do not require a dedicated facility, but must be performed using aseptic procedures. Operative procedures conducted at field sites need not be performed in dedicated facilities, but must be performed using aseptic procedures;

(x) No animal will be used in more than one major operative procedure from which it is allowed to recover, unless:

(A) Justified for scientific reasons by the principal investigator in writing;

(B) Required as routine veterinary procedure or to protect the health or well-being of the animal as determined by the attending veterinarian; or

(C) In other special circumstances as determined by the Administrator on an individual basis. Written requests and supporting data should be sent to the Administrator, APHIS, USDA, 6505 Belcrest Road, Room 268, Hyattsville, MD 20782;

(xi) Methods of euthanasia used must be in accordance with the definition of the term set forth in 9 CFR part 1, § 1.1 of this subchapter, unless a deviation is justified for scientific reasons, in writing, by the investigator.

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to approve, require modifications in (to secure approval), or request full Committee review of any of those activities. If full Committee review is requested for a proposed activity, approval of that activity may be granted only after review, at a convened meeting of a quorum of the IACUC, and with the approval vote of a majority of the quorum present. No member may participate in the IACUC review or approval of an activity in which that member has a conflicting interest (e.g., is personally involved in the activity), except to provide information requested by the IACUC, nor may a member who has a conflicting interest contribute to the constitution of a quorum.

(3) The IACUC may invite consultants to assist in the review of complex issues arising out of its review of proposed activities. Consultants may not approve or withhold approval of an activity, and may not vote with the IACUC unless they are also members of the IACUC.

(4) The IACUC shall notify principal investigators and the research facility in writing of its decision to approve or withhold approval of those activities related to the care and use of animals, or of modifications required to secure IACUC approval. If the IACUC decides to withhold approval of an activity, it shall include in its written notification a statement of the reasons for its decision and give the principal investigator an opportunity to respond in person or in writing. The IACUC may reconsider its decision, with documentation in Committee minutes, in light of the information provided by the principal investigator.

(5) The IACUC shall conduct continuing reviews of activities covered by this subchapter at appropriate intervals as determined by the IACUC, but no less than annually.

(6) The IACUC may suspend an activity that it previously approved if it determines that the activity is not being conducted in accordance with the description of that activity provided by the principal investigator and approved by the Committee. The IACUC may suspend an activity only after review of the matter at a convened meeting of a quorum of the

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IACUC and with the suspension vote of a majority of the quorum present.

(7) If the IACUC suspends an activity involving animals, the Institutional Official, in consultation with the IACUC, shall review the reasons for suspension, take appropriate corrective action, and report that action with a full explanation to APHIS and any Federal agency funding that activity; and

(8) Proposed activities and proposed significant changes in ongoing activities that have been approved by the IACUC may be subject to further appropriate review and approval by officials of the research facility. However, those officials may not approve an activity involving the care and use of animals if it has not been approved by the IACUC.

(e) A proposal to conduct an activity involving animals, or to make a significant change in an ongoing activity involving animals, must contain the following:

(1) Identification of the species and the approximate number of animals to be used;

(2) A rationale for involving animals, and for the appropriateness of the species and numbers of animals to be used;

(3) A complete description of the proposed use of the animals;

(4) A description of procedures designed to assure that discomfort and pain to animals will be limited to that which is unavoidable for the conduct of scientifically valuable research, including provision for the use of analgesic, anesthetic, and tranquilizing drugs where indicated and appropriate to minimize discomfort and pain to animals; and

(5) A description of any euthanasia method to be used.

§ 2.32 Personnel qualifications.

(a) It shall be the responsibility of the research facility to ensure that all scientists, research technicians, animal technicians, and other personnel involved in animal care, treatment, and use are qualified to perform their duties. This responsibility shall be fulfilled in part through the provision of

training and instruction to those personnel.

(b) Training and instruction shall be made available, and the qualifications of personnel reviewed, with sufficient frequency to fulfill the research facility's responsibilities under this section and § 2.31.

(c) Training and instruction of personnel must include guidance in at least the following areas:

(1) Humane methods of animal maintenance and experimentation, including:

(i) The basic needs of each species of animal;

(ii) Proper handling and care for the various species of animals used by the facility;

(iii) Proper pre-procedural and post-procedural care of animals; and

(iv) Aseptic surgical methods and procedures;

(2) The concept, availability, and use of research or testing methods that limit the use of animals or minimize animal distress;

(3) Proper use of anesthetics, analgesics, and tranquilizers for any species of animals used by the facility;

(4) Methods whereby deficiencies in animal care and treatment are reported, including deficiencies in animal care and treatment reported by any employee of the facility. No facility employee, Committee member, or laboratory personnel shall be discriminated against or be subject to any reprisal for reporting violations of any regulation or standards under the Act;

(5) Utilization of services (e.g., National Agricultural Library, National Library of Medicine) available to provide information:

(i) On appropriate methods of animal care and use;

(ii) On alternatives to the use of live animals in research;

(iii) That could prevent unintended and unnecessary duplication of research involving animals; and

(iv) Regarding the intent and requirements of the Act.

§ 2.33 Attending veterinarian and adequate veterinary care.

(a) Each research facility shall have an attending veterinarian who shall provide adequate veterinary care to its

animals in compliance with this section:

(1) Each research facility shall employ an attending veterinarian under formal arrangements. In the case of a part-time attending veterinarian or consultant arrangements, the formal arrangements shall include a written program of veterinary care and regularly scheduled visits to the research facility;

(2) Each research facility shall assure that the attending veterinarian has appropriate authority to ensure the provision of adequate veterinary care and to oversee the adequacy of other aspects of animal care and use;

(3) The attending veterinarian shall be a voting member of the IACUC. Provided, however, that a research facility with more than one Doctor of Veterinary Medicine (DVM) may appoint to the IACUC another DVM with delegated program responsibility for activities involving animals at the research facility.

(b) Each research facility shall establish and maintain programs of adequate veterinary care that include:

(1) The availability of appropriate facilities, personnel, equipment, and services to comply with the provisions of this subchapter;

(2) The use of appropriate methods to prevent, control, diagnose, and treat diseases and injuries, and the availability of emergency, weekend, and holiday care;

(3) Daily observation of all animals to assess their health and well-being. Provided, however, that daily observation of animals may be accomplished by someone other than the attending veterinarian; and Provided, further, that a mechanism of direct and frequent communication is required so that timely and accurate information on problems of animal health, behavior, and well-being is conveyed to the attending veterinarian;

(4) Guidance to principal investigators and other personnel involved in the care and use of animals regarding handling, immobilization, anesthesia, analgesia, tranquilization, and euthanasia; and

(5) Adequate pre-procedural and post-procedural care in accordance

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(iii) The date of birth or approximate age; and

2.35 Recordkeeping requirements.

(iv) The color and any distinctive markings;

(a) The research facility shall

mark assigned to each dog or cat by the research facility.

(c) In addition to the information required to be kept and maintained by every research facility concerning each live dog or cat under paragraph (a) of this section, every research facility, transporting, selling, or otherwise disposing of any live dog or cat to another person, shall make and maintain records or forms which fully and correctly disclose the following information:

(1) Minutes of IACUC meetings, including records of attendance, activities of the Committee, and Committee deliberations;

(2) Records of proposed activities involving animals and proposed significant changes in activities involving animals, and whether IACUC approval was given or withheld; and

(3) Records of semiannual LACUC reports and recommendations includ-

(1) The name and address of the person to whom a live dog or cat is transported, sold, or otherwise disposed of;

(2) The date of transportation, sale, euthanasia, or other disposition of the animal; and

(3) The method of transportation, including the name of the initial carrier or intermediate handler, or if a privately owned vehicle is used to transport the dog or cat, the name of the owner of the privately owned vehicle.

(d)(1) The USDA Interstate and International Certificate of Health for Small Animals (VS Form 18-1) and Record of Dogs and Cats on Hand (VS Form 18-5) are forms which may be used by research facilities to keep and maintain the information required.

(2) The USDA Interstate and International Certificate of Health Examination for Small Animals (VS Form 18-1) and Record of Disposition of Dogs and Cats (VS Form 18-6) are forms which may be used by research facilities to keep and maintain the information required by paragraph (b) of this section.

facilities to keep and maintain or to transport, or to sell, or to give away, or to license or registered under the Act;

(4) The date of acquisition of each dog or cat;

(5) The official USDA tag number or station assigned to each dog or cat under § 2.38(g) of this subpart;

(6) A description of each dog or cat which shall include:

(i) The species and breed or type of animal;

(ii) The sex;

(e) One copy of the record containing the information required by paragraphs (b) and (c) of this section shall accompany each shipment of any live dog or cat sold or otherwise disposed of by a research facility. *Provided*, however, that information which indicates the source and date of acquisition of any dog or cat need not appear on the copy of the record accompany-

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(iii) The date of birth or approximate age; and
 (iv) The color and any distinctive markings;

(a) The research facility shall maintain the following IACUC records:

- (1) Minutes of IACUC meetings, including records of attendance, activities of the Committee, and Committee deliberations;
- (2) Records of proposed activities in each live dog or cat under paragraph

(7) Any identification number or mark assigned to each dog or cat by the research facility.

(c) In addition to the information required to be kept and maintained by every research facility concerning each live dog or cat under paragraph

(a) of this section, every research facility transporting, selling, or otherwise disposing of any live dog or cat to another person, shall make and maintain records or forms which fully and correctly disclose the following information:

(1) Records of proposed activities involving animals and proposed significant changes in activities involving animals, and whether IACUC approval as given or withheld; and

(3) Records of semiannual IACUC reports and recommendations includ-

(1) The name and address of the person to whom a live dog or cat is transported, sold, or otherwise disposed of;

(2) The date of transportation, sale, euthanasia, or other disposition of the animal; and

(3) The method of transportation, including the name of the initial carrier or intermediate handler, or if a privately owned vehicle is used to transport the animal, the name of the owner.

port the dog or cat, the name of the owner of the privately owned vehicle.

(d)(1) The USDA Interstate and International Certificate of Health for Small Animals (VS Form 18-1) and Record of Dogs and Cats on Hand (VS Form 18-5) are forms which may be used by research facilities to keep and maintain the inventories of privately owned vehicles.

(2) The USDA Interstate and International Certificate of Health Examination for Small Animals (VS Form 18-1) and Record of Disposition of Dogs and Cats (VS Form 18-6) are forms which may be used by research facilities to keep and maintain the information required by paragraph (b) of this section.

facilities to keep and maintain or to transport, or to sell, or to give away, or to license or registered under the Act;

(4) The date of acquisition of each dog or cat;

(5) The official USDA tag number or station assigned to each dog or cat under § 2.38(g) of this subpart;

(6) A description of each dog or cat which shall include:

(i) The species and breed or type of animal;

(ii) The sex;

(e) One copy of the record containing the information required by paragraphs (b) and (c) of this section shall accompany each shipment of any live dog or cat sold or otherwise disposed of by a research facility. *Provided*, however, that information which indicates the source and date of acquisition of any dog or cat need not appear on the copy of the record accompany-

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(1) Assure that professionally acceptable standards governing the care, treatment, and use of animals, including primates, are observed.

this section shall be retained by the research facility.

(f) All records and reports shall be maintained for at least three years. Records that relate directly to proposed activities and proposed significant changes in ongoing activities re-

quiring appropriate use of anesthetic, analgesic, and tranquilizing drugs, prior to, during, and following actual research, teaching, testing, surgery, or experimentation were followed by the research facility;

(2) Assure that each principal inves-

(3) Assure that the facility is adhering to the standards and regulations under the Act, and that it has required that exceptions to the standards and regulations be specified and explained

by the principal investigator and approved by the IACUC. A summary of all such exceptions must be attached to the facility's annual report. In addition to identifying the IACUC-approved exceptions, this summary must include a brief explanation of the exceptions, as well as the species and number of animals affected.

(4) State the location of all facilities where animals were housed or used in actual research testing, teaching or

crets or commercial or financial information that is privileged or confidential will be governed by applicable sections of the Freedom of Information Act. Whenever the Administrator notifies a research facility in writing that specified records shall be retained pending completion of an investigation or proceeding under the Act, the records, or portions thereof, may be examined, copied, or otherwise used for these purposes:

(b) State the common names and the numbers of animals upon which teaching, research, experiments, or tests were conducted involving no pain distress, or use of pain-relieving drugs. Routine procedures (e.g., injections, routine blood sampling) should be

(a) The reporting facility shall be that segment of the research facility, or that department, agency, or instrumentality which holds those records until their disposition is authorized in writing by the Administrator.

§ 2.36 Annual report.

(b) State the common names and the numbers of animals upon which experiments, teaching, research, surgery, or tests were conducted involving accompanying pain or distress to the animals and for which appropriate anesthetic, analgesic, or tranquilizing

mentality of the United States, that uses or intends to use live animals in research, tests, experiments, or for teaching. Each reporting facility shall submit an annual report to the APHIS, REAC Sector Supervisor for the State where the facility is located on or before December 1 of each calendar year. The report shall be signed and certified by the CEO or Institutional Official, and shall cover the previous Federal fiscal year.

(b) The annual report shall:

(1) State the common names and the numbers of animals upon which teaching, experiments, research, surgery, or tests were conducted involving accompanying pain or distress to the animals and for which the use of appropriate anesthetic, analgesic, or tranquilizing drugs would have adversely affected the procedures, results, or interpretation of the teaching, research, experiments, surgery, or tests. An explanation of the adverse procedure(s) must be included in the report.

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or distress in these animals and the reasons such drugs were not used shall be attached to the annual report.

(B) State the common names and the numbers of animals being bred, conditioned, or held for use in teaching, testing, experiments, research, or surgery but not yet used for such purposes.

§ 2.37 Federal research facilities.

Each Federal research facility shall establish an Institutional Animal Care and Use Committee which shall have the same composition, duties, and responsibilities required of nonfederal research facilities by § 2.31 with the following exceptions:

(a) The Committee shall report deficiencies to the head of the Federal agency conducting the research rather than to APHIS; and

(b) The head of the Federal agency conducting the research shall be responsible for all corrective action to be taken at the facility and for the granting of all exceptions to inspection protocol.

§ 2.38 Miscellaneous.

(a) *Information as to business: furnishing of same by research facilities.* Each research facility shall furnish to any APHIS official any information concerning the business of the research facility which the APHIS official may request in connection with the enforcement of the provisions of the Act, the regulations, and the standards in this subchapter. The information shall be furnished within a reasonable time and as may be specified in the request for information.

(b) *Access and inspection of records and property.* (1) Each research facility shall, during business hours, allow APHIS officials:

(i) To enter its place of business;

(ii) To examine records required to be kept by the Act and the regulations in this part;

(iii) To make copies of the records;

(iv) To inspect the facilities, property and animals, as the APHIS officials consider necessary to enforce the provisions of the Act, the regulations and the standards in this subchapter; and

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(v) To document, by the taking of photographs and other means, conditions and areas of noncompliance.

(2) The use of a room, table or other facilities necessary for the proper examination of the records and for inspection of the property or animals shall be extended to APHIS officials by the research facility.

(c) *Publication of names of research facilities subject to the provisions of this part.* APHIS will publish lists of research facilities registered in accordance with the provisions of this subpart in the FEDERAL REGISTER. The lists may be obtained upon request from the APHIS, REAC Sector Supervisor.

(d) *Inspection for missing animals.* Each research facility shall allow, upon request and during business hours, police or officers of other law enforcement agencies with general law enforcement authority (not those agencies whose duties are limited to enforcement of local animal regulations) to enter its place of business to inspect animals and records for the purpose of seeking animals that are missing, under the following conditions:

(1) The police or other law officer shall furnish to the research facility a written, description of the missing animal and the name and address of its owner before making a search;

(2) The police or other law officer shall abide by all security measures required by the research facility to prevent the spread of disease, including the use of sterile clothing, footwear, and masks where required, or to prevent the escape of an animal.

(e) *Confiscation and destruction of animals.* (1) If an animal being held by a research facility is not being used to carry out research, testing, or experimentation, and is found by an APHIS official to be suffering as a result of the failure of the research facility to comply with any provision of the regulations or the standards set forth in this subchapter, the APHIS official shall make a reasonable effort to notify the research facility of the condition of the animal(s) and request that the condition be corrected and that adequate care be given to alleviate the animal's suffering or distress.

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(v) To document, by the taking of photographs and other means, conditions and areas of noncompliance.

(2) The use of a room, table or other facilities necessary for the proper examination of the records and for inspection of the property or animals shall be extended to APHIS officials by the research facility.

(c) *Publication of names of research facilities subject to the provisions of this part.* APHIS will publish lists of research facilities registered in accordance with the provisions of this subpart in the FEDERAL REGISTER. The lists may be obtained upon request from the APHIS, REAC Sector Supervisor.

(d) *Inspection for missing animals.* Each research facility shall allow, upon request and during business hours, police or officers of other law enforcement agencies with general law enforcement authority (not those agencies whose duties are limited to enforcement of local animal regulations) to enter its place of business to inspect animals and records for the purpose of seeking animals that are missing, under the following conditions:

(1) The police or other law officer shall furnish to the research facility a written, description of the missing animal and the name and address of its owner before making a search;

(2) The police or other law officer shall abide by all security measures required by the research facility to prevent the spread of disease, including the use of sterile clothing, footwear, and masks where required, or to prevent the escape of an animal.

(e) *Confiscation and destruction of animals.* (1) If an animal being held by a research facility is not being used to carry out research, testing, or experimentation, and is found by an APHIS official to be suffering as a result of the failure of the research facility to comply with any provision of the regulations or the standards set forth in this subchapter, the APHIS official shall make a reasonable effort to notify the research facility of the condition of the animal(s) and request that the condition be corrected and that adequate care be given to alleviate the animal's suffering or distress.

shall be identified at the time of such delivery for transportation, purchase, sale, disposal, or acquisition in one of the following ways:

- (i) By the official tag or tattoo which was affixed to the animal at the time it was acquired by the research facility, as required by this section;
- (ii) By a tag, tattoo, or collar, applied to the live dog or cat by the research facility and which individually identifies the dog or cat by number.
- (2) All official tag or tattoo numbers shall be correctly listed in the records of purchase, acquisition, disposal, or sale which shall be maintained in accordance with § 2.35.
- (3) Unweaned puppies or kittens which are maintained as a litter while they are maintained in the same primary enclosure, provided the dam has been individually identified.
- (4) The official tag shall be made of a durable alloy such as brass, bronze, or steel or of a durable plastic. Aluminum of a sufficient thickness to assure the tag is durable and legible may also be used. The tag may be circular in shape and not less than 1 1/4 inches in diameter, or oblong and flat in shape and not less than 2 inches by 3/4 inch, and riveted to an acceptable collar.
- (5) Each tag shall have the following embossed or stamped on so that it is easily readable:
 - (i) The letters "USDA";
 - (ii) Numbers identifying the State and dealer, exhibitor, or research facility (e.g., 39-AB); and
 - (iii) Numbers identifying the animal (e.g., 82488).
- (6) Official tags shall be serially numbered and shall be applied to dogs or cats in the manner set forth in section 11 as close to consecutive numerical order as possible. No tag number shall be used to identify more than one animal or shall be reused within a 5-year period.
- (7) Research facilities may obtain, at their own expense, official tags from commercial tag manufacturers.¹ At

¹ A list of the commercial manufacturers who produce these tags and are known to the Department may be obtained from the APHIS, REAC Sector Supervisor. Any man-

Continued

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§ 2.38

the time the research facility is registered, the Department will assign identification letters and numbers to be used on the official tags.

(8) Each research facility shall be held accountable for all official tags acquired. In the event an official tag is lost from a dog or cat while in the possession of a research facility, the facility shall make a diligent effort to locate and reapply the tag to the proper animal. If the lost tag is not located, the research facility shall affix another official tag to the animal in the manner prescribed in this section and record the tag number on the official records.

(9) When a dog or cat, wearing or identified by an official tag arrives at a research facility, the facility may continue to use that tag to identify the dog or cat or the tag may be replaced as indicated in paragraph (g)(1) of this section. All tags removed by a research facility shall be retained and disposed of as indicated in this section.

(10) Where a dog or cat to which is affixed or which is identified by an official tag is euthanized, or dies from other causes, the research facility shall remove and retain the tag for the required period, as set forth in paragraph (g)(1) of this section.

(11) All official tags removed and retained by a research facility shall be held until called for by an APHIS official or for a period of 1 year.

(12) When official tags are removed from animals for disposal, the tags must be disposed of so as to preclude their reuse for animal identification. No animal identification number shall be used within any 5-year period following its previous use.

(h) *Health certification.* (1) No research facility, including a Federal research facility, shall deliver to any intermediate handler or carrier for transportation, in commerce, or shall transport in commerce any dog, cat, or nonhuman primate unless the dog, cat, or nonhuman primate is accompanied by a health certificate executed and issued by a licensed veterinarian. The health certificate shall state that:

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ty. Research facilities shall comply with the identification of animals requirements set forth in § 2.38(g).

(k) *Compliance with standards and prohibitions.* (1) Each research facility shall comply in all respects with the regulations set forth in subpart C of this part and the standards set forth in part 3 of this subchapter for the humane handling, care, treatment, housing, and transportation of animals; *Provided, however,* That exceptions to the standards in part 3 and the provisions of subpart C of this part may be made only when such exceptions are specifically and justified in the proposal to conduct the activity and are approved by the IACUC.

(2) No person shall obtain live random source dogs or cats by use of false pretenses, misrepresentation, or deception.

(3) No person shall acquire, buy, sell, exhibit, use for research, transport, or offer for transportation, any stolen animal.

Subpart D—Attending Veterinarian and Adequate Veterinary Care

§ 2.40 Attending veterinarian and adequate veterinary care (dealers and exhibitors).

(a) Each dealer or exhibitor shall have an attending veterinarian who shall provide adequate veterinary care to its animals in compliance with this section.

(1) Each dealer and exhibitor shall employ an attending veterinarian under formal arrangements. In the case of a part-time attending veterinarian or consultant arrangements, the formal arrangements shall include a written program of veterinary care and regularly scheduled visits to the premises of the dealer or exhibitor; and

(2) Each dealer and exhibitor shall assure that the attending veterinarian has appropriate authority to ensure the provision of adequate veterinary care and to oversee the adequacy of other aspects of animal care and use.

(b) Each dealer or exhibitor shall establish and maintain programs of adequate veterinary care that include:

(1) The availability of appropriate facilities, personnel, equipment, and services to comply with the provisions of this subchapter.

(2) The use of appropriate methods to prevent, control, diagnose, and treat diseases and injuries, and the availability of emergency, weekend, and holiday care;

(3) Daily observation of all animals to assess their health and well-being; *Provided, however,* That daily observation of animals may be accomplished by someone other than the attending veterinarian; and *Provided, further,* That a mechanism of direct and frequent communication is required so that timely and accurate information on problems of animal health, behavior, and well-being is conveyed to the attending veterinarian;

(4) Adequate guidance to personnel involved in the care and use of animals regarding handling, immobilization, anesthesia, analgesia, tranquilization, and euthanasia; and

(5) Adequate pre-procedural and post-procedural care in accordance with established veterinary medical and nursing procedures.

Subpart E—Identification of Animals

§ 2.50 Time and method of identification.

(a) A class "A" dealer (breeder) shall identify all live dogs and cats on the premises as follows:

(1) All live dogs and cats held on the premises, purchased, or otherwise acquired, sold or otherwise disposed of, or removed from the premises for delivery to a research facility or exhibitor or to another dealer, or for sale, through an auction sale or to any person for use as a pet, shall be identified by an official tag of the type described in § 2.51 affixed to the animal's neck by means of a collar made of material generally considered acceptable to pet owners as a means of identifying their pet dogs or cats²; or

² In general, well fitted collars made of leather or plastic will be acceptable under this provision. The use of certain types of chains presently used by some dealers may also be deemed acceptable. APHIS will determine

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§ 2.132 Procurement of random source dogs and cats, dealers.

(a) A class "B" dealer may obtain live random source dogs and cats only from:

(1) Other dealers who are licensed under the Act and in accordance with the regulations in part 2;

(2) State, county, or city owned and operated animal pounds or shelters; and

(3) A legal entity organized and operated under the laws of the State in which it is located as an animal pound or shelter, such as a humane shelter or contract pound.

(b) A class "B" dealer shall not obtain live random source dogs and cats from individuals who have not bred and raised the dogs and cats on their own premises.

(c) Live nonrandom source dogs and cats may be obtained from persons who have bred and raised the dogs and cats on their own premises, such as hobby breeders.

(d) No person shall obtain live random source dogs or cats by use of false pretenses, misrepresentation, or deception.

(e) Any dealer, exhibitor, research facility, carrier, or intermediate handler who also operates a private or contract animal pound or shelter shall comply with the following:

(1) The animal pound or shelter shall be located on premises that are physically separated from the licensed or registered facility. The animal housing facility of the pound or shelter shall not be adjacent to the licensed or registered facility.

(2) Accurate and complete records shall be separately maintained by the licensee or registrant and by the pound or shelter. The records shall be in accordance with §§ 2.75 and 2.76, unless the animals are lost or stray. If the animals are lost or stray, the pound or shelter records shall provide:

(i) An accurate description of the animal;

(ii) How, where, from whom, and when the dog or cat was obtained;

(iii) How long the dog or cat was held by the pound or shelter before being transferred to the dealer; and

(iv) The date the dog or cat was transferred to the dealer.

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(3) Any dealer who obtains or acquires a live random source dog or cat from a private or contract pound or shelter, including a pound or shelter he or she operates, shall hold the dog or cat for a period of at least 10 full days, not including the day of acquisition, excluding time in transit, after acquiring the animal, and otherwise in accordance with § 2.101.

PART 3—STANDARDS

Subpart A—Specifications for the Humane Handling, Care, Treatment, and Transportation of Dogs and Cats

FACILITIES AND OPERATING STANDARDS

See:

3.1 Facilities, general.

3.2 Facilities, indoor.

3.3 Facilities, outdoor.

3.4 Primary enclosures.

ANIMAL HEALTH AND HUSBANDRY STANDARDS

3.5 Feeding.

3.6 Watering.

3.7 Sanitation.

3.8 Employees.

3.9 Classification and separation.

3.10 [Reserved]

TRANSPORTATION STANDARDS

3.11 Consignments to carriers and intermediate handlers.

3.12 Primary enclosures used to transport live dogs and cats.

3.13 Primary conveyances (motor vehicle, rail, air, and marine).

3.14 Food and water requirements.

3.15 Care in transit.

3.16 Terminal facilities.

3.17 Handling.

Subpart B—Specifications for the Humane Handling, Care, Treatment, and Transportation of Guinea Pigs and Hamsters

FACILITIES AND OPERATING STANDARDS

3.25 Facilities, general.

3.26 Facilities, indoor.

3.27 Primary enclosures.

ANIMAL HEALTH AND HUSBANDRY STANDARDS

3.29 Feeding.

3.30 Watering.

3.31 Sanitation.

3.32 Employees.

3.33 Classification and separation.

3.34 [Reserved]

Part 3**Transportation of Marine Mammals**

TRANSPORTATION STANDARDS

3.35 Consignments to carriers and intermediate handlers.

3.36 Primary enclosures used to transport live guinea pigs and hamsters.

3.37 Primary conveyances (motor vehicle, rail, air, and marine).

3.38 Food and water requirements.

3.39 Care in transit.

3.40 Terminal facilities.

3.41 Handling.

Subpart E—Specifications for the Humane Handling, Care, Treatment, and Transportation of Marine Mammals

FACILITIES AND OPERATING STANDARDS

3.100 Special considerations regarding compliance and/or variance.

3.101 Facilities, general.

3.102 Facilities, indoor.

3.103 Facilities, outdoor.

3.104 Space requirements.

ANIMAL HEALTH AND HUSBANDRY STANDARDS

3.105 Feeding.

3.106 Water quality.

3.107 Sanitation.

3.108 Employees or attendants.

3.109 Separation.

3.110 Veterinary care.

3.111 [Reserved]

TRANSPORTATION STANDARDS

3.112 Consignments to carriers and intermediate handlers.

3.113 Primary enclosures used to transport live marine mammals.

3.114 Primary conveyances (motor vehicle, rail, air, and marine).

3.115 Food and water requirements.

3.116 Care in transit.

3.117 Terminal facilities.

3.118 Handling.

Subpart F—Specifications for the Humane Handling, Care, Treatment, and Transportation of Warmblooded Animals Other Than Dogs, Cats, Rabbits, Hamsters, Guinea Pigs, Nonhuman Primates, and Marine Mammals

FACILITIES AND OPERATING STANDARDS

3.125 Facilities, general.

3.126 Facilities, indoor.

3.127 Facilities, outdoor.

3.128 Space requirements.

ANIMAL HEALTH AND HUSBANDRY STANDARDS

3.129 Feeding.

3.130 Watering.

3.131 Sanitation.

3.132 Employees.

3.133 Separation.

3.134 [Reserved]

TRANSPORTATION STANDARDS

3.85 Consignments to carriers and intermediate handlers.

3.135 [Reserved]

§ 3.1**9 CFR Ch. I (1-1-90 Edition)****TRANSPORTATION STANDARDS****§ 3.2 Facilities, indoor.**

(a) **Heating.** Indoor housing facilities for dogs or cats shall be sufficiently heated when necessary to protect the dogs or cats from cold, and to provide for their health and comfort. The ambient temperature shall not be allowed to fall below 50° F. For dogs and cats not acclimated to lower temperatures, sufficient heating shall be provided.

(b) **Ventilation.** Indoor housing facilities for dogs or cats shall be adequately ventilated to provide for the health and comfort of the animals at all times. Such facilities shall be provided with fresh air either by means of windows, doors, vents, or air conditioning and shall be ventilated so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or air conditioning, shall be provided when the ambient temperature is 85° F. or higher.

(c) Lighting.

Indoor housing facilities for dogs or cats shall have ample light, by natural or artificial means, or both, of good quality and well distributed. Such lighting shall provide uniformly distributed illumination of sufficient light intensity to permit routine inspection and cleaning during the entire working period. Primary enclosures shall be so placed as to protect the dogs or cats from excessive illumination.

(d) **Interior surfaces.** The interior building surfaces of indoor housing facilities shall be constructed and maintained so that they are substantially impervious to moisture and may be readily sanitized.

(e) **Drainage.** A suitable method shall be provided to rapidly eliminate excess water from indoor housing facilities. If drains are used, they shall be properly constructed and kept in good repair to avoid foul odors therefrom. If closed drainage systems are used, they shall be equipped with traps and so installed as to prevent any backup of sewage onto the floor of the room.

Facilities and Operating Standards**§ 3.1 Facilities, general.**

(a) **Structural strength.** Indoor and outdoor housing facilities for dogs or cats shall be structurally sound and shall be maintained in good repair, to protect the animals from injury, to contain the animals, and to restrict the entrance of other animals.

(b) **Water and electric power.** Reliable and adequate electric power, if required to comply with other provisions of this subpart, and adequate potable water shall be available.

(c) **Storage.** Supplies of food and bedding shall be stored in facilities which adequately protect such supplies against infestation or contamination by vermin. Refrigeration shall be provided for supplies of perishable food.

(d) **Waste disposal.** Provisions shall be made for the removal and disposal of animal and food wastes, bedding, dead animals, and debris. Disposal facilities shall be so provided and operated as to minimize vermin infestation, odors, and disease hazards.

(e) **Washrooms and sinks.** Facilities, such as washrooms, basins, or sinks, shall be provided to maintain cleanliness among animal caretakers.

(32 FR 3273, Feb. 24, 1967, as amended at 44 FR 63492, Nov. 2, 1979)

Animal and Plant Health Inspection Service, USDA**§ 3.5****Dogs, indoor.**

(a) **Space requirements—(1) Dogs and cats.** Primary enclosures shall be constructed and maintained so as to provide sufficient space to allow each dog and cat to turn about freely and to easily stand, sit and lie in a comfortable normal position.

(2) **Dogs.** (i) In addition to the provisions of paragraph (b) (1) of this section, each dog housed in any primary enclosure shall be provided a minimum square footage of floor space equal to the mathematical square of the sum of the length of the dog in inches, as measured from the tip of its nose to the base of its tail, plus 6 inches, expressed in square feet. Not more than 12 adult nonconditioned dogs shall be housed in the same primary enclosure.

(ii) **Dog houses with chains.** If dog houses with chains are used as primary enclosures for dogs kept outdoors, the chains used shall be so placed or attached that they cannot become entangled with the chains of other dogs or any other objects. Such chains shall be of a type commonly used for the size dog involved and shall be attached to the dog by means of a well fitted collar. Such chains shall be at least three times the length of the dog as measured from the tip of its nose to the base of its tail and shall allow the dog convenient access to the dog house.

§ 3.4 Primary enclosures.

All primary enclosures for dogs and cats shall conform to the following requirements:

(a) **General—(1) Requirements for primary enclosures for dogs and cats.** (i) Primary enclosures shall be structurally sound and maintained in good repair to protect the dogs and cats from injury, to contain them, and to keep predators out.

(ii) Primary enclosures shall be constructed and maintained so as to enable the dogs and cats to remain dry and clean.

(iii) Primary enclosures shall be constructed and maintained so that the dogs or cats contained therein have convenient access to clean food and water as required in this subpart.

(iv) The floors of the primary enclosures shall be constructed so as to protect the dogs' and cats' feet and legs from injury.

(2) **Additional requirements for primary enclosures housing cats.** (i) In all enclosures having a solid floor, a receptacle containing sufficient clean litter shall be provided to contain excreta.

(ii) Each primary enclosure shall be provided with a solid resting surface or surfaces which, in the aggregate, shall be of adequate size to comfortably hold all occupants of the primary enclosure at the same time. Such resting surface or surfaces shall be elevated in primary enclosures housing two or more cats.

ANIMAL HEALTH AND HUSBANDRY
STANDARDS

§ 3.5 Feeding.

(a) Dogs and cats shall be fed at least once each day except as otherwise might be required to provide adequate veterinary care. The food shall

¹This requirement may be computed by using the following equation: (length of dog in inches + 6) × (width of dog in inches + 6) = Required area in square inches/144 = Required square feet of floor space.

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be free from contamination, wholesome, palatable, and of sufficient quantity and nutritive value to meet the normal daily requirements for the condition and size of the dog or cat.

(b) Food receptacles shall be accessible to all dogs or cats and shall be located so as to minimize contamination by excreta. Feeding pans shall be durable and kept clean. The food receptacles shall be sanitized at least once every 2 weeks. Disposable food receptacles may be used but must be discarded after each feeding. Self feeders may be used for the feeding of dry food, and they shall be sanitized regularly to prevent molding, deterioration or caking of feed.

3.6. Watering.

If portable water is not accessible to the dogs and cats at all times, portable liquids shall be offered to such animals at least twice daily for periods of not less than 1 hour, except as might otherwise be required to provide adequate veterinary care. Watering receptacles shall be kept clean and shall be rinsed at least once every 2 weeks.

sanitized at least once every 2 weeks in manner provided in paragraph (b)(3) of this section.

(3) Cages, rooms and hard-surfaced pens or runs shall be sanitized by washing them with hot water (180° F.), mechanical soap or detergent as in a mechanical cage washer, or by washing all soiled surfaces with a detergent solution followed by a safe and effective disinfectant, or by cleaning all soiled surfaces with live steam. Pens or runs consisting of gravel, sand, or dirt shall be sanitized by removing the soiled gravel, sand, or dirt and replacing it as necessary.

(c) Housekeeping. Premises (buildings and grounds) shall be kept clean and in good repair in order to protect the animals from injury and to facilitate the prescribed husbandry practices set forth in this subparagraph. Premises shall remain free of accumulations of trash.

(d) Pest control. An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and main-

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(a) Cleaning of primary enclosures. Primary enclosures shall be removed from primary enclosures as often as necessary to prevent contamination of the dogs or cats contained therein and to reduce disease hazards and odors. When a hosing or flushing method is used for cleaning a primary enclosure commonly known as a cage, any dog or cat contained therein shall be removed from such enclosure during the cleaning process, and adequate measures shall be taken to protect the animals from other such enclosures from being contaminated with water and other wastes.

(b) Sanitization of primary enclosures. (1) Prior to the introduction of nonconditioned dogs or cats into primary primary enclosures previously occupied, such enclosures shall be sanitized in the manner provided in paragraph (b)(3) of this section.

(2) Primary enclosures for dogs or cats shall be sanitized often enough to prevent an accumulation of debris or excrement, or a disease hazard. Provided, however, that such enclosures shall be

sanitized at least once every 2 weeks in manner provided in paragraph (b)(3) of this section.

(3) Cages, rooms and hard-surfaced pens or runs shall be sanitized by washing them with hot water (180° F.), mechanical soap or detergent as in a mechanical cage washer, or by washing all soiled surfaces with a detergent solution followed by a safe and effective disinfectant, or by cleaning all soiled surfaces with live steam. Pens or runs consisting of gravel, sand, or dirt shall be sanitized by removing the soiled gravel, sand, or dirt and replacing it as necessary.

(c) Housekeeping. Premises (buildings and grounds) shall be kept clean and in good repair in order to protect the animals from injury and to facilitate the prescribed husbandry practices set forth in this subparagraph. Premises shall remain free of accumulations of trash.

(d) Pest control. An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and main-

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A sufficient number of employees shall be utilized to maintain the prescribed level of husbandry practices set forth in this subpart. Such practices shall be under the supervision of animal caretakers who has a background in animal husbandry or

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shall dogs or cats be housed in the same primary enclosure with any other species of animals.

(e) Dogs or cats under quarantine or treatment for a communicable disease shall be separated from other dogs or cats and other susceptible species of animals in such a manner as to minimize dissemination of such disease.

§ 3.10 [Reserved]

TRANSPORTATION STANDARDS

AUTHORITY: Sections 3.11 through 3.17 issued under secs. 3, 5, 6, 10, 11, 14, 16, 17, 21; 80 Stat. 353; 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423 U.S.C. 2133, 2135, 2136, 2140, 2141, 2144, 2146, 2147, 2151; 37 FR 28464, 28477, 38 FR 19111.

Sources: Sections 3.11 through 3.17 appear at 42 FR 31561, June 21, 1977, unless otherwise noted.

§ 3.11 Consignments to carriers and intermediate handlers.

(a) Carriers and intermediate handlers shall not accept any live dog or cat presented by any dealer, research facility, exhibitor, or operator of an auction sale, if such consignor furnishes to the carrier or intermediate handler a certificate, signed by the consignor, stating that the primary enclosure complies with § 3.12 of the standards, unless such primary enclosure is obviously defective or damaged and it is apparent that it cannot reasonably be expected to contain the live dog or cat without causing suffering or injury to such live dog or cat. A copy of such certificate shall accompany the shipment to destination. The certificate shall include at least the following information:

(1) Name and address of the consignee;

(2) Tag number or tattoo assigned to each dog or cat, pursuant to § 2.250 and 2.54 of the regulations;

(3) A certifying statement (e.g., "I hereby certify that the _____ (number) primary enclosure(s) which are used to transport the animal(s) in _____ (description of commodity) will _____ (insert verb) to _____ (insert verb) the requirements of the regulations.").

TRANSPORTATION STANDARDS

AUTHORITY: Sections 3.11 through 3.17 issued under secs. 3, 5, 6, 10, 11, 14, 16, 17, 21, 80 Stat. 333, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423 (7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2144, 2146, 2147, 2151, 37 CFR 2846.1, 2847.1, 38 CFR 19141. SOURCE: Sections 3.11 through 3.17 appear at 42 FR 31561, June 21, 1977, unless otherwise noted.

§ 3.11 Consignments to carriers and intermediate handlers.

(a) Carriers and intermediate handlers shall not accept any live dog or cat presented by any dealer, research institution, or commercial (comply with

to contain the live dog or cat without causing suffering or injury to such live dog or cat. A copy of such certificate shall accompany the shipment to destination. The certificate shall include at least the following information:

(1) Name and address of the consignor;

(2) Tag number or tattoo assigned to each dog or cat pursuant to § 2.50 and 2.54 of the regulations;

(3) A certifying statement (e.g., "I hereby certify that the _____ (number) primary enclosure(s) which are used to transport the animal(s) in

TRANSPORTATION STANDARDS

AUTHORITY: Sections 3.11 through 3.17 issued under secs. 3, 5, 6, 10, 11, 14, 16, 17, 21, 80 Stat. 333, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423 (7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2144, 2146, 2147, 2151, 37 CFR 2846.2, 2847.7, 38 CFR 1914.1.

SOURCE: Sections 3.11 through 3.17 appear at 42 FR 31561, June 21, 1977, unless otherwise noted.

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to contain the live dog or cat without causing suffering or injury to such live dog or cat. A copy of such certificate shall accompany the shipment to destination. The certificate shall include at least the following information:

- (1) Name and address of the consignor;
- (2) Tag number or tattoo assigned to each dog or cat pursuant to § 2.50 and 2.54 of the regulations;
- (3) A certifying statement (e.g., "I hereby certify that the _____ (number) primary enclosure(s) which are used to transport the animal(s) in

of the United States or any State or local government for shipment in commerce, more than 4 hours prior to the scheduled departure of the primary conveyance on which it is to be transported: *Provided*, however, That the carrier or intermediate handler and any dealer, research facility, exhibitor, operator of an auction sale, or other person, or any department, agency, or instrumentality of the United States or any State or local government may mutually agree to extend the time of acceptance to not more than 6 hours if specific prior scheduling of the animal shipment to destination has been made.

(b) Any carrier or intermediate handler shall only accept for transportation or transport, in commerce, any live dog or cat in a primary enclosure which conforms to the requirements set forth in § 3.12 of the standards: *Provided*, however, That any carrier or intermediate handler may accept for transportation or transport, in commerce, any live dog or cat consigned to Part 160 of this title on specified date which shall not be more than 10 days prior to delivery of such dog or cat for transportation in commerce, stating that such live dog or cat is acclimated to air temperatures lower than those prescribed in §§ 3.16 and 3.17. A copy of such certificate shall accompany the shipment to destination. The certificate shall include at least the following information:

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(1) Name and address of the consignee; or.

(2) Tag number or tattoo assigned to each dog or cat pursuant to §§ 2.30 and 2.54 of the regulations;

(3) A certifying statement (e.g., "I hereby certify that the animal(s) in this shipment is (are), to the best of my knowledge, acclimated to air temperatures lower than 7.2° C. (45° F.);"

(4) The signature of the USDA accredited veterinarian, assigned accreditation number and date;

(d) Carriers and Intermediate handlers shall attempt to notify the consignee at least once in every 6 hour period following the arrival of any live dog or cat at the animal holding area of the terminal cargo facility. The time, date, and method of each attempted notification and the final notification to the consignee and the name of the person notifying the consignee shall be recorded on the copy of the shipping document retained by the carrier of intermediate handler and on a copy of the shipping document accompanying the animal shipment.

[42 FR 31561, June 21, 1977, as amended at 43 FR 21161, May 16, 1978; 44 FR 63492, Nov. 2, 1979]

§ 3.12 Primary enclosures used to transport live dogs and cats.

No dealer, research facility, exhibitor, or operator of an auction sale shall offer for transportation or transport, in commerce, any live dog or cat in a primary enclosure which does not conform to the following requirements:

(a) Primary enclosures, such as compartments, transport cages, cartons, or crates, used to transport live dogs and cats shall be constructed in such a manner that:

(1) The structural strength of the enclosure shall be sufficient to contain the live dogs and cats and to withstand the normal rigors of transportation;

(2) The interior of the enclosure shall be free from any protrusions that could be injurious to the live dogs or cats contained therein;

(3) The openings of such enclosures are easily accessible at all times for

emergency removal of the live dogs or cats;

(4) Except as provided in paragraph (h) of this section, such primary enclosures shall comply with one of the following requirements:

(i) There are ventilation openings located on two opposing walls of the primary enclosure and the ventilation openings on each of the two walls shall be at least 16 percent of the surface area of each such wall and the total combined surface area of the ventilation openings shall be at least 14 percent of the total combined surface area of all the walls of the primary enclosure, or

(ii) There are ventilation openings on three walls of the primary enclosure and the ventilation openings on two opposing walls shall be at least 8 percent of the total surface area of the two walls and the ventilation openings on the third wall of the primary enclosure shall be at least 50 percent of the total surface area of such wall and the total combined surface area of the ventilation openings shall be at least 14 percent of the total combined surface area of all the walls of the primary enclosure, or

(iii) There are ventilation openings located on all four walls of the primary enclosure and the ventilation openings on each of the four walls shall be at least 8 percent of the total surface of each wall and the total combined surface area of the ventilation openings shall be at least 14 percent of the total combined surface area of all the walls of the primary enclosure. *Provided, however, that at least one-third of the total minimum area required for ventilation of the primary enclosure shall be located on the lower one-half of the primary enclosure and at least one-third of the total minimum area required for ventilation of the primary enclosure shall be located on the upper one-half of the primary enclosure;*

(5) Except as provided in paragraph (h) of this section, projecting rims or other devices shall be on the exterior of the outside walls with any ventilation openings to prevent obstruction of the ventilation openings and to provide a minimum air circulation space of 1.9 centimeters (.75 inches) between

Animal and Plant Health Inspection Service, USDA**§ 3.13**

the primary enclosure and any adjacent cargo or conveyance wall; and

(6) Except as provided in paragraph (h) of this section, a adequate handles or other devices for lifting shall be provided on the exterior of the primary enclosure to enable the primary enclosure to be lifted without tilting and to ensure that the person handling the primary enclosure will not be in contact with the dog or cat.

(b) Live dogs or cats transported in the same primary enclosure shall be of the same species and maintained in compatible groups. Puppies or kittens shall not be transported in the same primary enclosure with adult dogs or cats, other than their dams.

(c) Primary enclosures used to transport live dogs and cats shall be large enough to ensure that each animal contained therein has sufficient space to turn about freely in a standing position using normal body movements, to stand and sit erect, and to lie in a natural position.

(d) A maximum of one live dog or cat, 6 months or more of age, or a maximum of one live puppy, 8 weeks to 6 months of age and weighing over 9 kilograms (20 pounds), shall be transported in a primary enclosure. Two live puppies and kittens, 8 weeks to 6 months of age, but not weighing over 9 kilograms (20 pounds) each and of comparable size, may be carried in the same primary enclosure. Weaned live puppies or kittens less than 8 weeks of age and of comparable size, or puppies or kittens which are less than 8 weeks of age and littermates accompanied by their dam, may be transported in the same primary enclosure to research laboratories.

(e) Primary enclosures used to transport live dogs and cats as provided in this section shall have solid bottoms to prevent leakage in shipment and shall be cleaned and sanitized in a manner prescribed in § 3.7 of the standards, if previously used. Such primary enclosures shall contain clean litter of a suitable absorbent material, which is safe and nontoxic to the dogs and cats, in sufficient quantity to absorb and cover excreta, unless the dogs or cats are on wire or other nonsolid floors.

(f) Primary enclosures used to transport live dogs and cats, except where

such primary enclosures are permanently affixed in the animal cargo space of the primary conveyance, shall be clearly marked on top and on one or more sides with the words "Live Animals" in letters not less than 2.5 centimeters (1 inch) in height, and with arrows or other markings to indicate the correct upright position of the container.

(g) Documents accompanying the shipment shall be attached in an easily accessible manner to the outside of a primary enclosure which is part of such shipment.

(h) When a primary enclosure is permanently affixed within the animal cargo space of the primary conveyance so that the front opening is the only source of ventilation for such primary enclosure, the front opening shall open directly to the outside or to an unobstructed aisle or passageway within the primary conveyance. Such front ventilation opening shall be at least 90 percent of the total surface area of the front wall of the primary enclosure and covered with bars, wire mesh or smooth expanded metal.

[7 U.S.C. 2131-2156, 42 FR 31562, June 21, 1978, as amended at 43 FR 21162, May 16, 1978; 45 FR 15880, March 11, 1980.]

[42 FR 31561, June 21, 1977, as amended at 43 FR 21162, May 16, 1978; 44 FR 63492, Nov. 2, 1979; 45 FR 37618, June 3, 1980.]

§ 3.13 Primary conveyances (motor vehicle, rail, air, and marine).

(a) The animal cargo space of primary conveyances used in transporting live dogs and cats shall be designed and constructed to protect the health and ensure the safety and comfort of the dogs and cats contained therein at all times.

(b) The animal cargo space shall be constructed and maintained in a manner to prevent the ingress of engine exhaust fumes and gases from the primary conveyance during transportation in commerce.

(c) No live dog or cat shall be placed in an animal cargo space that does not have a supply of air sufficient for normal breathing for each live animal contained therein, and the primary enclosures shall be positioned in the animal cargo space in such a manner

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that each dog or cat has access to sufficient air for normal breathing.

(d) Primary enclosures shall be positioned in the primary conveyance in such a manner that in an emergency the live dogs and cats can be removed from the primary conveyance as soon as possible.

(e) The interior of the animal cargo space shall be kept clean.

(f) Live dogs and cats shall not be transported with any material substance (e.g., dry ice) or device which may reasonably be expected to be injurious to the health and well-being of the dogs and cats unless proper precaution is taken to prevent such injury.

offering any live dog or cat to any carrier or intermediate handler for transportation in commerce shall affix to the outside of the primary enclosure used for transporting such dog or eat written instructions concerning the food and water requirements of such dog or cat while being transported.

(g) No carrier or intermediate handler shall accept any live dog or cat for transportation in commerce unless written instructions concerning the food and water requirements of such dog or cat while being so transported is affixed to the outside of its primary enclosure.

§ 3.14 Food and water requirements.

(a) All live dogs or cats shall be offered potable water within 4 hours prior to being transported in commerce. Any live dogs or cats less than 16 weeks of age being offered to any carrier for transportation in commerce shall be offered at least 60 cubic centimeters (ccs) (approximately 2 ounces) of potable water within 4 hours prior to being so offered for transportation in commerce. Dealers, exhibitors, research facilities and operators of auction sales shall provide potable water to all live dogs and cats transported in their own primary conveyance at least every 12 hours after such transportation is initiated, and carriers and intermediate handlers shall provide potable water to all live dogs and cats at least every 12 hours after acceptance for transportation in commerce.

(b) Each live dog and cat over 16 weeks of age shall be fed at least once in each 24 hour period. Live puppies and kittens less than 16 weeks of age shall have food made available to them at least every 12 hours. The time periods provided for in this paragraph shall apply to carriers and intermediate handlers after acceptance of any live dog or cat for transportation in commerce, and shall apply to dealers, exhibitors, research facilities, and operators of auction sales who transport live dogs and cats in their own primary conveyance after such transportation is initiated.

(c) Any dealer, research facility, exhibitor or operator of an auction sale

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shall not be removed from their primary enclosures unless placed in other primary enclosures or facilities conforming to the requirements provided in this subpart.

§ 3.16 Terminal facilities.

Carriers and intermediate handlers shall not commingle live animals with inanimate cargo. All animal holding areas of a terminal facility of any carrier or intermediate handler wherein live animal shipments are maintained shall be cleaned and sanitized in a manner prescribed in § 3.7 of the standards often enough to prevent an accumulation of debris or excreta, to minimize vermin infestation, and to prevent a disease hazard. An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained for all animal holding areas. Any animal holding area containing live dogs or cats shall be provided with fresh air by means of windows, doors, vents, or air conditioning and may be ventilated or air circulated by means of fans, blowers, or an air conditioning system so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or fans or blowers or air conditioning shall be used for any animal holding area containing live dogs and cats when the air temperature within such animal holding area is 23.9° C. (75° F.) or higher. The air temperature around any live dog or cat in any animal holding area shall not be allowed to fall below 7.2° C. (45° F.) nor be allowed to exceed 29.5° C. (85° F.) at any time. Provided, however, That no live dog or cat shall be subjected to air temperatures around any such dog or cat in excess of 23.9° C. (75° F.) for more than 4 hours at any time. To ascertain compliance with the provisions of this paragraph, the air temperature around any live dog or cat shall be measured and read in the manner prescribed in § 3.16 of this part, for a period of more than 45 minutes.

§ 3.15 Care in transit.

(a) During surface transportation it shall be the responsibility of the driver or other employee to visually observe the live dogs or cats as frequently as circumstances may dictate, but not less than once every 4 hours, to assure that they are receiving sufficient air for normal breathing. Their ambient temperatures are within the prescribed limits, all other applicable standards being complied with and to determine whether any of the live dogs or cats are in obvious physical distress and to provide any needed veterinary care as soon as possible. When transported by air, live dogs and cats shall be visually observed by the carrier as frequently as circumstances may dictate, but not less than once every 4 hours, if the animal cargo space is accessible during flight. If the animal cargo space is not accessible during flight, the carrier shall visually observe the live dogs or cats whenever loaded and unloaded and whenever the animal cargo space is otherwise accessible to assure that they are receiving sufficient air for normal breathing, their ambient temperatures are within the prescribed limits, all other applicable standards are being complied with and to determine whether any of the live dogs or cats are in obvious physical distress and to provide any needed veterinary care as soon as possible. No dog or cat in obvious physical distress shall be transported in commerce.

(b) During the course of transportation, in commerce, live dogs or cats

tance between the top and bottom of such primary enclosure.

[43 FR 56215, Dec. 1, 1978]

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shall not be removed from their primary enclosures unless placed in other primary enclosures or facilities conforming to the requirements provided in this subpart.

§ 3.17 Handling.

(a) Carriers and intermediate handlers shall move live dogs and cats from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance to the animal holding area of the terminal facility as expeditiously as possible. Carriers and intermediate handlers holding any live dog or cat in an animal holding area of a terminal facility or in transporting any live dog or cat from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance to the animal holding area of the terminal facility, including loading and unloading procedures, shall provide the following:

(1) *Shelter from sunlight.* When sunlight is likely to cause overheating or discomfort, sufficient shade shall be provided to protect the live dogs and cats from the direct rays of the sun and such live dogs or cats shall not be subjected to surrounding air temperatures which exceed 29.5° C. (85° F.), and which shall be measured and read in the manner prescribed in § 3.16 of this part, for a period of more than 45 minutes.

(2) *Shelter from rain or snow.* Live dogs and cats shall be provided protection to allow them to remain dry during rain or snow.

(3) *Shelter from cold weather.* Transporting devices shall be covered to provide protection for live dogs and cats when the outdoor air temperature falls below 10° C. (50° F.), and such live dogs or cats shall not be subjected to surrounding air temperatures which fall below 7.2° C. (45° F.), and which shall be measured and read in the manner prescribed in § 3.16 of this part, for a period of more than 45 minutes unless such dogs or cats are accompanied by a certificate of acclimation to lower temperatures as prescribed in § 3.11(c).

(b) Care shall be exercised to avoid handling of the primary enclosure in such a manner that may cause physi-

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cal or emotional trauma to the live dog or cat contained therein.

(c) Primary enclosures used to transport any live dog or cat shall not be tossed, dropped, or needlessly tilted and shall not be stacked in a manner which may reasonably be expected to result in their falling.

[43 FR 21162, May 16, 1978, as amended at 43 FR 56215, Dec. 1, 1978]

Subpart B—Specifications for the Humane Handling, Care, Treatment, and Transportation of Guinea Pigs and Hamsters

FACILITIES AND OPERATING STANDARDS

§ 3.26 Facilities, indoor.

(a) **Heating.** Indoor housing facilities for guinea pigs or hamsters shall be sufficiently heated when necessary to protect the animals from the cold, and to provide for their health and comfort. The ambient temperature shall not be allowed to fall below 60° F. nor to exceed 85° F.

(b) **Ventilation.** Indoor housing facilities for guinea pigs or hamsters shall be adequately ventilated to provide for the health and comfort of the animals at all times. Such facilities shall be provided with fresh air either by means of windows, doors, vents, or air conditioning, and shall be ventilated so as to minimize drafts, odors, and moisture condensation. The ambient temperature shall not be allowed to rise above 85° F.

(c) **Lighting.** Indoor housing facilities for guinea pigs or hamsters shall have ample light, by natural or artificial means, or both, of good quality and well distributed. Such lighting shall provide uniformly distributed illumination of sufficient light intensity to permit routine inspection and cleaning during the entire working period.

Primary enclosures shall be so placed as to protect the guinea pigs or hamsters from excessive illumination.

(d) **Interior surfaces.** The interior building surfaces of indoor housing facilities shall be constructed and maintained so that they are substantially impervious to moisture and may be readily sanitized.

§ 3.27 Facilities, outdoor.

(a) Hamsters shall not be housed in outdoor facilities.

(b) Guinea pigs shall not be housed in outdoor facilities unless such facilities are located in an appropriate climate and prior approval for such outdoor housing is obtained from the Deputy Administrator.

§ 3.28 Primary enclosures.

All primary enclosures for guinea pigs and hamsters shall conform to the following requirements:

(a) **General.** (1) Primary enclosures shall be structurally sound and maintained in good repair to protect the guinea pigs and hamsters from injury.

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Such enclosures, including their racks, shelving and other accessories, shall be constructed of smooth material substantially impervious to liquids and no other hamsters and which provides at least 121 square inches of floor space: *Provided, however, that in the case of dwarf hamsters such floor space shall be at least 25 square inches.*

(ii) A nursing female hamster, together with her litter, shall be housed in a primary enclosure which contains no other hamsters and which provides at least 121 square inches of floor space: *Provided, however, that in the case of dwarf hamsters such floor space shall be at least 25 square inches.*

(iii) The minimum amount of floor space per individual hamster and the maximum number of hamsters allowed in a single primary enclosure, except as provided for nursing females in paragraph (b)(3)(ii) of this section, shall be in accordance with the following table:

	Age	Minimum space per hamster (square inches)		Maximum population per enclosure
		Dwarf	Other	
Weaning to 5 wks	...	5	5	100
5 to 10 wks	...	75	125	20
10 wks or more	...	9	150	16

ANIMAL HEALTH AND HUSBANDRY STANDARDS

§ 3.29 Feeding.

(a) Guinea pigs and hamsters shall be fed each day except as otherwise required to provide adequate veterinary care. The food shall be free from contamination, wholesome, palatable and of sufficient quantity and nutritive value to meet the normal daily requirements for the condition and size of the guinea pig or hamster.

(b) Food comprising the basic diet shall be at least equivalent in quality and content to pelleted rations produced commercially and commonly available from feed suppliers.

(c) The basic diet of guinea pigs and hamsters may be supplemented with good quality fruits or vegetables consistent with their individual dietary requirements.

(d) Food receptacles, if used, shall be accessible to all guinea pigs or hamsters in a primary enclosure and shall be located so as to minimize contamination by excreta. All food receptacles shall be kept clean and shall be sanitized.

§ 3.29 Space requirements.

Maximum space per guinea pig (square inches)
60
180

(3) **Hamsters.** In addition to the provisions of paragraph (b)(1) of this section, the following space requirements are applicable to primary enclosures for hamsters:

(i) The interior height of any primary enclosure used to confine hamsters shall be at least 5½ inches, except that in the case of dwarf ham-

sters, such interior height shall be at least 5 inches.

(ii) A nursing female hamster, together with her litter, shall be housed in a primary enclosure which contains no other hamsters and which provides at least 121 square inches of floor space: *Provided, however, that in the case of dwarf hamsters such floor space shall be at least 25 square inches.*

(iii) The minimum amount of floor space per individual hamster and the maximum number of hamsters allowed in a single primary enclosure, except as provided for nursing females in paragraph (b)(3)(ii) of this section, shall be in accordance with the following table:

	Age	Minimum space per hamster (square inches)		Maximum population per enclosure
		Dwarf	Other	
Weaning to 5 wks	...	5	5	100
5 to 10 wks	...	75	125	20
10 wks or more	...	9	150	16

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(3) A certifying statement (e.g., "I hereby certify that the animal(s) in this shipment is (are), to the best of my knowledge, acclimated to air temperatures lower than 7.2° C. (45° F.)"; and
 (4) The signature of the USDA accredited veterinarian, assigned accreditation number, and date.

(d) Carriers and intermediate handlers shall attempt to notify the consignee at least once in every 6 hour period following the arrival of any live guinea pig or hamster at the animal holding area of the terminal cargo facility. The time, date, and method of each attempted notification and the final notification to the consignee and the name of the person notifying the consignee shall be recorded on the copy of the shipping document retained by the carrier or intermediate handler and on a copy of the shipping document accompanying the animal shipment.

[42 FR 31563, June 21, 1977, as amended at 43 FR 22163, May 16, 1978; 44 FR 63492, Nov. 2, 1979]

§ 3.36 Primary enclosures used to transport live guinea pigs and hamsters.

No dealer, research facility, exhibitor, or operator of an auction sale shall offer for transportation or transhipment, in commerce, any live guinea pig or hamster in a primary enclosure which does not conform to the following requirements:

- (a) Primary enclosures, such as compartments, transport cages, cartons, or crates, used to transport live guinea pigs or hamsters shall be constructed in such a manner that (1) the structural strength of the enclosure shall be sufficient to contain the live guinea pigs or hamsters and to withstand the normal rigors of transportation; (2) the interior of the enclosure shall be free from any protrusions that could be injurious to the live guinea pigs or hamsters contained therein; (3) the inner surfaces of corrugated fiberboard, cardboard, or plastic containers shall be covered or laminated with wire mesh or screen where necessary to prevent escape of the animals; (4) the openings of such enclosures are easily accessible at all times for emergency removal of the live guinea pigs

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or hamsters; (5) except as provided in paragraph (1) of this section, there are ventilation openings located on two opposite walls of the primary enclosure and the ventilation openings on each such wall shall be at least 16 percent of the total surface area of each such wall, or there are ventilation openings located on all four walls of the primary enclosure and the ventilation openings on each such wall shall be at least 8 percent of the total surface area of each such wall; *Provided, however, that at least one-third of the total minimum area required for ventilation of the primary enclosure shall be located on the lower one-half of the primary enclosure and at least one-third of the total minimum area required for ventilation of the primary enclosure shall be located on the upper one-half of the primary enclosure, except as provided in paragraph (1) of this section, projecting rims or other devices shall be on the exterior of the outside walls with any ventilation openings to prevent obstruction of the ventilation openings and to provide a minimum air circulation space of 1.9 centimeters (.75 inches) between the primary enclosure and any adjacent cargo or conveyance wall; and (7) except as provided in paragraph (1) of this section, adequate handholds or other devices for lifting shall be provided on the exterior of the primary enclosure to enable the primary enclosure to be lifted without tilting and to ensure that the person handling the primary enclosure will not be in contact with the guinea pigs or hamsters.*

(b) Live guinea pigs or hamsters transported in the same primary enclosure shall be of the same species and maintained in compatible groups.

(c) Primary enclosures used to transport live guinea pigs or hamsters shall be large enough to ensure that each animal contained therein has sufficient space to turn about freely and to make normal postural adjustments.

(d) Not more than 15 live guinea pigs shall be transported in the same primary enclosure. No more than 50 live hamsters shall be transported in the same primary enclosure.

(e) In addition to the other provisions of this section, the following re-

Minimum space per live guinea pig

Age	Weight (grams)	Square centimeters	Square inches	Square centimeters	Square inches
Up to 350	197.6	30
350 to 500	200.3	34.5
Over 500	356.8	55

(1) *Guinea pigs.* (1) The interior height of primary enclosures used to transport live guinea pigs weighing up to 500 grams shall be at least 15.2 centimeters (.6 inches) and the interior height of primary enclosures used to transport live guinea pigs weighing over 500 grams shall be at least 17.8 centimeters (.7 inches).
 (ii) Each live guinea pig transported in a primary enclosure shall be provided a minimum amount of floor space in accordance with the following table:

Minimum space per live hamster

Age	Weight 5 wks	Square centimeters	Square inches	Other
Weaning to 5 wks	32.2
5 to 10 wks	48.3
Over 10 wks	56.1

(2) *Hamsters.* (i) The interior height of primary enclosures used to transport live hamsters shall be at least 15.2 centimeters (.6 inches) except that in the case of dwarf hamsters such interior height shall be at least 12.7 centimeters (5 inches).
 (ii) Each live hamster transported in a primary enclosure shall be provided a minimum amount of floor space in accordance with the following table:

Age	Weight 5 wks	Square centimeters	Square inches	Other
.....	96.8
.....	15
.....	11

(h) Documents accompanying the shipment shall be attached in an easily accessible manner to the outside of a primary enclosure which is part of such shipment.
 (i) When a primary enclosure is permanently affixed within the animal cargo space of the primary conveyance so that the front opening is the only source of ventilation for such primary enclosure, the front opening shall open directly to the outside or to an unobstructed aisle or passageway within the primary conveyance. Such front ventilation opening shall be at least 90 percent of the total surface area of the front wall of the primary enclosure and covered with bars, wire mesh or smooth expanded metal.
 (42 FR 31563, June 21, 1977, as amended at 43 FR 21163, May 16, 1978)

§ 3.37 Primary conveyances (motor vehicle, rail, air, and marine).

(a) The animal cargo space of primary conveyances used in transport-

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ing live guinea pigs and hamsters shall be designed and constructed to protect the health and ensure the safety and comfort of the live guinea pigs and hamsters at all times.

(b) The animal cargo space shall be constructed and maintained in a manner to prevent the ingress of engine exhaust fumes and gases from the primary conveyance during transportation in commerce.

(c) No live guinea pig or hamster shall be placed in an animal cargo space that does not have a supply of air sufficient for normal breathing for each live animal contained therein, and the primary enclosures shall be positioned in the animal cargo space in such a manner that each live guinea pig or hamster has access to sufficient air for normal breathing.

(d) Primary enclosures shall be positioned in the primary conveyance in such a manner that in an emergency the live guinea pigs or hamsters can be removed from the primary conveyance as soon as possible. (e) The interior of the animal cargo space shall be kept clean.

(f) Live guinea pigs and hamsters shall not be transported with any material substance (e.g., dry ice) or device which may reasonably be expected to be injurious to the health and well-being of the guinea pigs and hamsters unless proper precaution is taken to prevent such injury.

(c) No carrier or intermediate handler shall accept for transportation, in commerce, any live guinea pig or hamster without an adequate supply of food or type of food, which provides the requirements for food and water, within the primary enclosure to meet the requirements of this section.

§ 3.39 Care in transit.

(a) During surface transportation, it shall be the responsibility of the driver or other employee to visually observe the live guinea pigs or hamsters as frequently as circumstances may dictate, but not less than once every 4 hours, to assure that they are receiving sufficient air for normal breathing, their ambient temperatures are within the prescribed limits, all other applicable standards are being complied with, and to determine whether any of the live guinea pigs or hamsters are in obvious physical distress and to provide any needed veterinary care as soon as possible. When transported by air, live guinea pigs and hamsters shall be visually observed by the carrier as frequently as circumstances may dictate, but not less than once every 4 hours, if the animal cargo space is accessible during flight. If the animal cargo space is not accessible during flight, the carrier shall visually observe the live guinea pigs or hamsters whenever loaded and unloaded and whenever the animal cargo space is otherwise accessible to the carrier.

Assure that they are receiving sufficient air for normal breathing, their ambient temperatures are within the prescribed limits, all other applicable standards are being complied with and to determine whether any such live guinea pigs or hamsters are in obvious physical distress. The carrier shall provide any needed veterinary care as soon as possible. No guinea pig or hamster in obvious physical distress shall be transported in commerce.

(b) During the course of transportation, in commerce, live guinea pigs or hamsters shall not be removed from their primary enclosures unless placed in other primary enclosures or facilities conforming to the requirements provided in this subpart.

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§ 3.40 Terminal facilities.

Carriers and intermediate handlers shall not commingle live animal shipments with inanimate cargo. All animal holding areas of a terminal facility of any carrier or intermediate handler wherein live animal shipments are maintained shall be cleaned and sanitized in a manner prescribed in § 3.31 of the standards often enough to prevent an accumulation of debris or excreta, to minimize vermin infestation and to prevent a disease hazard. An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained for all animal holding areas. Any animal holding area containing live guinea pigs or hamsters shall be provided with fresh air by means of windows, doors, vents, or air conditioning and may be ventilated or air circulated by means of fans, blowers, or an air conditioning system so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or fans or blowers or air conditioning shall be used for any animal holding area containing live guinea pigs and hamsters when the outdoor air temperature falls below 10° C (50° F.) and such live guinea pigs and hamsters remain dry during rain or snow.

(1) *Shelter from sunlight.* When sunlight is likely to cause overheating or discomfort, sufficient shade shall be provided to protect the live guinea pigs and hamsters from the direct rays of the sun and such live guinea pigs or hamsters shall not be subjected to surrounding air temperatures which exceed 29.5° C (85° F.), and which shall be measured and read in the manner prescribed § 3.40 of this part, for a period of more than 45 minutes.

(2) *Shelter from rain or snow.* Live guinea pigs and hamsters shall be provided protection to allow them to remain dry during rain or snow. (3) *Shelter from cold weather.* Transporting devices shall be covered to provide protection for live guinea pigs and hamsters when the outdoor air temperature falls below 10° C (50° F.) and such live guinea pigs and hamsters shall not be subjected to surrounding air temperatures which fall below 7.2° C (45° F.), and which shall be measured and read in the manner prescribed in § 3.40 of this part, for a period of more than 45 minutes.

(b) Care shall be exercised to avoid handling of the primary enclosure in such a manner that may cause physical or emotional trauma to the live guinea pig or hamster contained therein.

(c) Primary enclosures used to transport any live guinea pig or hamster shall not be tossed, dropped, or needlessly tilted and shall not be stacked in a manner which may reasonably be expected to result in their falling.

[43 FR 21163, May 16, 1978, as amended at 43 FR 56216, Dec. 1, 1978]

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Subpart C—Specifications for the Humane Handling, Care, Treatment and Transportation of Rabbits

FACILITIES AND OPERATING STANDARDS

§ 3.50 Facilities, general.

(a) *Structural strength.* Indoor and outdoor housing facilities for rabbits shall be structurally sound and shall be maintained in good repair, to protect the animals from injury, to contain the animals, and to restrict the entrance of other animals.

(b) *Water and electric power.* Reliable and adequate electric power, if reliable and adequate electric power, if required to comply with other provisions of this subpart, and adequate potable water shall be available.

(c) *Storage.* Supplies of food and bedding shall be stored in facilities which adequately protect such supplies against infestation or contamination by vermin. Refrigeration shall be provided for supplies of perishable food.

(d) *Waste disposal.* Provision shall be made for the removal and disposal of animal and food wastes, bedding, dead animals, and debris. Disposal facilities shall be so provided and operated as to minimize vermin infestation, odors, and disease hazards.

(e) *Washroom and sinks.* Facilities, such as washrooms, basins, or sinks, shall be provided to maintain cleanliness among animal caretakers.

[32 FR 3272, Feb. 24, 1967, as amended at 44 FR 63492, Nov. 2, 1979]

(c) *Lighting.* Indoor housing facilities for rabbits shall have ample light, by natural or artificial means, or both, of good quality and well distributed. Such lighting shall provide uniformly distributed illumination of sufficient light intensity to permit routine inspection and cleaning during the entire working period. Primary enclosures shall be so placed as to protect the rabbits from excessive illumination.

(d) *Interior surfaces.* The interior building surfaces of indoor housing facilities shall be constructed and maintained so that they are substantially impervious to moisture and may be readily sanitized.

§ 3.52 Facilities, outdoor.

(a) *Shelter from sunlight.* When sunlight is likely to cause overheating or discomfort, sufficient shade shall be provided to allow all rabbits kept outdoors to protect themselves from the direct rays of the sun. When the atmospheric temperature exceeds 90° F., artificial cooling shall be provided by a sprinkler system or other means.

(b) *Shelter from rain or snow.* Rabbits kept outdoors shall be provided with access to shelter to allow them to remain dry during rain or snow.

(c) *Shelter from cold weather.* Shelter shall be provided for all rabbits kept outdoors when the atmospheric temperature falls below 40° F. (d) *Protection from predators.* Outdoor housing facilities for rabbits shall be fenced or otherwise enclosed to minimize the entrance of predators.

(e) *Drainage.* A suitable method shall be provided to rapidly eliminate excess water.

§ 3.53 Primary enclosures for rabbits.

(a) *Heating.* Indoor housing facilities for rabbits shall be adequately ventilated to provide for the health and comfort of the animals at all times. Such facilities shall be provided with fresh air either by means of windows, doors, vents, or air conditioning and shall be ventilated so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or air conditioning, shall be provided when the ambient temperature is 85° F. or higher.

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(3) Primary enclosures shall be constructed and maintained so that the rabbits contained therein have convenient access to clean food and water as required in this subpart.

(4) The floors of the primary enclosures shall be constructed so as to protect the rabbits' feet and legs from injury. Litter shall be provided in all primary enclosures having solid floors.

(5) A suitable nest box containing clean nesting material shall be provided in each primary enclosure housing a female with a litter less than one month of age.

(b) *Space requirements.* Primary enclosures shall be constructed and maintained so as to provide sufficient space for the animal to make normal postural adjustments with adequate freedom of movement. Each rabbit housed in a primary enclosure shall be provided a minimum amount of floor space, exclusive of the space taken up by food and water receptacles, in accordance with the following table:

Groups.....	Category	Individual weights (pounds)	Minimum space per rabbit (square inches)
3 through 5.....	3 through 5.....	144	144
6 through 8.....	6 through 8.....	288	288
9 or more.....	9 or more.....	432	432
Individual adults.....	3 through 5.....	180	180
	6 through 8.....	360	360
	9 through 11.....	540	540
Nursing females.....	12 or more.....	720	720
	3 through 5.....	576	576
	6 through 8.....	720	720
	9 through 11.....	864	864
	12 or more.....	1080	1080

ANIMAL HEALTH AND HUSBANDRY STANDARDS

§ 3.54 Feeding.

(a) Rabbits shall be fed at least once each day except as otherwise might be required to provide adequate veterinary care. The food shall be free from contamination, wholesome, palatable and of sufficient quantity and nutritive value to meet the normal daily requirements for the condition and size of the rabbit.

(b) Food receptacles shall be accessible to all rabbits in a primary enclosure and shall be located so as to minimize contamination by excreta. All food receptacles shall be kept clean and sanitized at least once every 2 weeks. If self feeders are used for the feeding of dry feed, measures must be taken to prevent molding, deterioration or caking of the feed.

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(3) Primary enclosures shall be constructed and maintained so that the rabbits contained therein have convenient access to clean food and water as required in this subpart.

(4) The floors of the primary enclosures shall be constructed so as to protect the rabbits' feet and legs from injury. Litter shall be provided in all primary enclosures having solid floors.

(5) A suitable nest box containing clean nesting material shall be provided in each primary enclosure housing a female with a litter less than one month of age.

§ 3.55 Watering.

Sufficient potable water shall be provided daily except as might otherwise be required to provide adequate veterinary care. All watering receptacles shall be sanitized when dirty. Provided, however, that such receptacles shall be sanitized at least once every 2 weeks.

§ 3.56 Sanitation.

(a) *Cleaning of primary enclosures.* (1) Primary enclosures shall be kept reasonably free of excreta, hair, cobwebs and other debris by periodic cleaning. Measures shall be taken to prevent the wetting of rabbits in such enclosures if a washing process is used.

(2) In primary enclosures equipped with solid floors, soiled litter shall be removed and replaced with clean litter at least once each week.

(3) If primary enclosures are equipped with wire or mesh floors, the troughs or pans under such enclosures shall be cleaned at least once each week. If worm bins are used under such enclosures they shall be maintained in a sanitary condition.

(b) *Sanitization of primary enclosures.* (1) Primary enclosures for rabbits shall be sanitized at least once every 30 days in the manner provided in paragraph (b)(3) of this section.

(2) Prior to the introduction of rabbits into empty primary enclosures previously occupied, such enclosures shall be sanitized in the manner provided in paragraph (b)(3) of this section.

(3) Primary enclosures for rabbits shall be sanitized by washing them with hot water (180° F.) and soap or detergent as in a mechanical cage washer, or by washing all soiled surfaces with a detergent solution followed by a safe and effective disinfectant, or by cleaning all soiled surfaces with live steam or flame.

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(c) **Housekeeping.** Premises (buildings and grounds) shall be kept clean and in good repair in order to protect the animals from injury and to facilitate the prescribed husbandry practices set forth in this subpart. Premises shall remain free of accumulations of trash.

(d) **Pest control.** An effective program for the control of insects, ectoparasites, and avian and mammalian predators shall be established and maintained.

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A sufficient number of employees shall be utilized to maintain the prescribed level of husbandry practices set forth in this subpart. Such practices shall be under the supervision of an animal caretaker who has a background in animal husbandry or care.

§ 3.58 Classification and separation.

Animals housed in the same primary enclosure shall be maintained in compatible groups, with the following additional restrictions:

(a) Rabbits shall not be housed in the same primary enclosure with any other species of animals unless required for scientific reasons.

(b) Rabbits under quarantine or treatment for a communicable disease shall be separated from other rabbits and other susceptible species of animals in such a manner as to minimize dissemination of such disease.

[Page 34]

TRANSPORTATION STANDARDS

AUTHORITY: Sections 3.60 through 3.66 issued under secs. 3, 5, 6, 10, 11, 14, 16, 17, 21; 80 Stat. 353; 84 Stat. 1561, 1562, 1563.

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partment, agency, or instrumentality of the United States or any State or local government for shipment, in commerce, more than 4 hours prior to the scheduled departure of the primary conveyance on which it is to be transported: Provided, however, That the carrier or intermediate handler and any dealer, research facility, exhibitor, operator of an auction sale, or other person, or any department, agency, or instrumentality of the United States or any State or local

extend the time of acceptance to not more than 6 hours if specific prior scheduling of the animal shipment to destination has been made.

(b) Any carrier or intermediate hauler shall only accept for transport or transport, in commerce, any live rabbit in a primary enclosure which conforms to the requirements set forth in § 3.61 of the standards provided however that any carrier or

intermediate handler may accept for transportation or transhipment, in commerce, any live rabbit consigned by any department, agency, or instrumentality of the United States having laboratory animal facilities or exhibiting animals or any licensed or registered dealer, research facility, exhibitor, operator of any auction sale, if such consignor furnishes to the carrier or intermediate handler a certificate signed by the consignor, stating that the primary enclosure complies with the requirements of this part.

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(4) The signature of the consignor, and date.

(c) Carriers or intermediate handlers whose facilities fail to meet the minimum temperature allowed by the standards may accept for transportation or transport, in commerce, any live rabbit consigned by any department, agency, or instrumentality of the United States or of any State or local government, or by any person (including any licensee or registrant under the Act), as well as any private individual, if the consignor furnishes

§ 361 Primary enclosures used to transport rabbits.

No dealer, research facility, exhibitor, or operator of an auction sale shall offer for transportation or transport, in commerce, any live rabbit in a primary enclosure which does not conform to the following requirements:

(a) Primary enclosures, such as compartments, transport cages, cartons, or crates, used to transport live rabbits shall be constructed in such a manner that:

to the carrier or intermediate hauler a certificate executed by a veterinarian accredited by this Department pursuant to Part 160 of this title on a specified date which shall not be more than 10 days prior to delivery of such rabbit for transportation in commerce, stating that such live rabbit is acclimated to air temperatures lower than those prescribed in §§ 3.65 and 3.66. A copy of such certificate shall accompany the shipment to destination. The certificate shall include at least the following information:

(1) Name and address of the consignee;

(2) The number of rabbits in the shipment;

(3) A certifying statement (e.g., "I hereby certify that the animal(s) in this shipment is (are), to the best of my knowledge, acclimated to air temperatures lower than 7.2° C. (45° F.).");

(4) The signature of the USDA at least one-third of the total minimum

primary enclosure is obviously defective or damaged and it is apparent that it cannot reasonably be expected to contain the live rabbit without causing suffering or injury to such live rabbit. A copy of such certificate shall accompany the shipment to destination. The certificate shall include at least the following information:

- (1) Name and address of the consignee;
- (2) The number of rabbits in the primary enclosure(s);
- (3) A certifying statement (e.g., "I hereby certify that the — (number) primary enclosure(s) which are used to transport the animal(s) in this shipment complies (comply) with USDA standards for primary enclosures (see CFR Part 3)."); and

Animal and Plant Health Inspection Service, USDA § 3.61

(4) The signature of the consignor, and date.

(c) Carriers or intermediate handlers whose facilities fail to meet the minimum temperature allowed by the standards may accept for transportation or transport, in commerce, any live rabbit consigned by any department, agency, or instrumentality of the United States or of any State or local government, or by any person (including any licensee or registrant under the Act), as well as any private individual, if the consignor furnishes

§ 361 Primary enclosures used to transport rabbits.

No dealer, research facility, exhibitor, or operator of an auction sale shall offer for transportation or transport, in commerce, any live rabbit in a primary enclosure which does not conform to the following requirements:

(a) Primary enclosures, such as compartments, transport cages, cartons, or crates, used to transport live rabbits shall be constructed in such a manner that:

to the carrier or intermediate hauler a certificate executed by a veterinarian accredited by this Department pursuant to Part 160 of this title on a specified date which shall not be more than 10 days prior to delivery of such rabbit for transportation in commerce, stating that such live rabbit is acclimated to air temperatures lower than those prescribed in §§ 3.65 and 3.66. A copy of such certificate shall accompany the shipment to destination. The certificate shall include at least the following information:

(1) Name and address of the consignee;

(2) The number of rabbits in the shipment;

(3) A certifying statement (e.g., "I hereby certify that the animal(s) in this shipment is (are), to the best of my knowledge, acclimated to air temperatures lower than 7.2° C. (45° F.).");

(4) The signature of the USDA at least one-third of the total minimum

credited veterinarian, assigned acreel-
tation number, and date.

(d) Carriers and intermediate han-
dlers shall attempt to notify the con-
signee at least once in every 6 hour
period following the arrival of any live
rabbit at the animal holding area of
the terminal cargo facility. The time
date, and method of each attempted
notification and the final notification
to the consignee and the name of the
person notifying the consignee shall
be recorded on the copy of the ship-
ping document retained by the carrier
or intermediate handler and on a copy
of the shipping document accompany-
ing the animal shipment.

area required for ventilation, ex-
terior projection, or exterior ventila-
tion, the primary enclosure shall be located on
the lower one-half of the primary en-
closure and at least one-third of the
total minimum area required for venti-
lation of the primary enclosure shall
be located on the upper one-half of
the primary enclosure.

(5) Except as provided in paragraph
(h) of this section, projecting rims or
other devices shall be on the exterior
of the outside walls with my ventila-
tion openings to prevent obstruction
of the ventilation openings and to pro-
vide a minimum air circulation space
1.9 centimeters (.75 inch) between the
primary enclosure and any adjacent
earay or conveyance wall; and

(6) Except as provided in paragraph
(h) of this section, adequate hand-

§ 3.62**9 CFR Ch. I (1-1-90 Edition)**

holds or other devices for lifting shall be provided on the exterior of the primary enclosure to enable the primary enclosure to be lifted without tilting and to ensure that the person handling the primary enclosure will not be in contact with the rabbit.

(b) Live rabbits transported in the same primary enclosure shall be maintained in compatible groups and shall not be transported in the same primary enclosure with other species of animals.

(c) Primary enclosures used to transport live rabbits shall be large enough to ensure that each rabbit contained therein has sufficient space to turn about freely and to make normal postural adjustments.

(d) Not more than 15 live rabbits shall be transported in the same primary enclosure.

(e) Primary enclosures used to transport live rabbits as provided in this section shall have solid bottoms to prevent leakage in shipment and shall be cleaned and sanitized in a manner prescribed in § 3.56 of the standards. If previously used, such primary enclosures shall contain clean litter of a suitable absorbent material which is safe and nontoxic to the rabbits. In sufficient quantity to absorb and cover excreta, unless the rabbits are on wire or other nonsolid floors.

(f) Primary enclosures used to transport live rabbits, except where such primary enclosures are permanently affixed in the animal cargo space of the primary conveyance, shall be clearly marked on top and on one or more sides with the words "Live Animal" in letters not less than 2.5 centimeters (1 inch) in height, and with arrows or other markings, to indicate the correct upright position of the container.

(g) Documents accompanying the shipment shall be attached in an easily accessible manner to the outside of a primary enclosure which is part of such shipment.

(h) When a primary enclosure is permanently affixed within the animal cargo space of the primary conveyance so that the front opening is the only source of ventilation for such primary enclosure, the front opening shall open directly to the outside or to an

unobstructed aisle or passageway within the primary conveyance. Such front ventilation opening shall be at least 90 percent of the total surface area of the front wall of the primary enclosure and covered with bars, wire mesh or smooth expanded metal.

[42 FR 31565, June 21, 1977, as amended at 43 FR 21164, May 16, 1978]

§ 3.62 Primary conveyances (motor vehicle, rail, air, and marine).

(a) The animal cargo space of primary conveyances used in transporting live rabbits shall be designed and constructed to protect the health, and ensure the safety and comfort of the rabbits contained therein at all times.

(b) The animal cargo space shall be constructed and maintained in a manner to prevent the ingress of engine exhaust fumes and gases from the primary conveyance during transportation in commerce.

(c) No live rabbit shall be placed in an animal cargo space that does not have a supply of air sufficient for normal breathing for each live animal contained therein, and the primary enclosures shall be positioned in the animal cargo space in such a manner that each rabbit has access to sufficient air for normal breathing.

(d) Primary enclosures shall be positioned in the primary conveyance in such a manner that in an emergency the live rabbits can be removed from the primary conveyance as soon as possible.

(e) The interior of the animal cargo space shall be kept clean.

(f) Live rabbits shall not be transported with any material, substance (e.g., dry ice) or device which may reasonably be expected to be injurious to the health and well-being of the rabbits unless proper precaution is taken to prevent such injury.

§ 3.63 Food and water requirements.

(a) If live rabbits are to be transported for a period of more than 6 hours, they shall have access to food and water or a type of food, which provides the requirements for food and water in quantity and quality sufficient to satisfy their food and water needs, during transit.

Animal and Plant Health Inspection Service, USDA**§ 3.65**

(b) Any dealer, research facility, exhibitor or operator of an auction sale offering any live rabbit to any carrier or intermediate handler for transportation in commerce, shall provide an adequate supply of food or type of food, which provides the requirements for food and water, within the primary enclosure to meet the requirements of this section.

(c) No carrier or intermediate handler shall accept for transportation, in commerce, any live rabbit without an adequate supply of food or type of food, which provides the requirements for food and water, within the primary enclosure to meet the requirements of this section.

§ 3.64 Care in transit.

(a) During surface transportation, it shall be the responsibility of the driver or other employee to visually observe the live rabbits as frequently as circumstances may dictate, but not less than once every 4 hours, to assure that they are receiving sufficient air for normal breathing, their ambient temperatures are within the prescribed limits, all other applicable standards are being complied with and to determine whether any of the live rabbits are in obvious physical distress and to provide any needed veterinary care as soon as possible. When transported by air, live rabbits shall be visually observed by the carrier as frequently as circumstances may dictate, but not less than once every 4 hours, if the cargo space is accessible during flight. If the animal cargo space is not otherwise accessible to the carrier during flight, the carrier shall visually observe the live rabbits whenever loaded and unloaded and whenever the animal cargo space is otherwise accessible to assure that they are receiving sufficient air for normal breathing, their ambient temperatures are within the prescribed limits, all other applicable standards are being complied with and to determine whether any such live rabbits are in obvious physical distress. The carrier shall provide any needed veterinary care as soon as possible. No rabbit in obvious physical distress shall be transported in commerce.

(b) During the course of transportation, in commerce, live rabbits shall

not be removed from their primary enclosure unless placed in other primary enclosures or facilities conforming to the requirements provided in this subpart.

§ 3.65 Terminal facilities.

Carriers and intermediate handlers shall not commingle live animal shipments with inanimate cargo. All animal holding areas of a terminal facility or any carrier or intermediate handler wherein live animal shipments are maintained shall be cleaned and sanitized in a manner prescribed in § 3.56 of the standards often enough to prevent an accumulation of debris or excreta, to minimize vermin infestation and to prevent a disease hazard.

An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained for all animal holding areas. Any animal holding area containing live rabbits shall be provided with fresh air by means of windows, doors, vents, or air conditioning and may be ventilated or air circulated by means of fans, blowers, or an air conditioning system so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or fans or blowers or air conditioning shall be used for any animal holding area containing live rabbits when the air temperature within such animal holding area is 23.9° C. (75° F.) or higher. The air temperature around any live rabbit allowed to fall below 7.2° C. (45° F.) nor be allowed to exceed 29.5° C. (85° F.) at any time. To ascertain compliance with the provisions of this paragraph, the air temperature around any live rabbit shall be measured and read outside the primary enclosure which contains such rabbit at a distance not to exceed .91 meters (3 feet) from any one of the external walls of the primary enclosure and on a level parallel to the bottom of such primary enclosure at a point which approximates half the distance between the top and bottom of such primary enclosure.

[43 FR 56216, Dec. 1, 1978]

§ 3.66**§ 3.66 Handling.**

(a) Carriers and intermediate handlers shall move live rabbits from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance to the animal holding area of the terminal facility as expeditiously as possible. Carriers and intermediate handlers holding any live rabbit in an animal holding area of a terminal facility or in transporting any live rabbit from the animal holding area of the terminal facility to the primary conveyance and from the primary holding area of the terminal facility, including loading and unloading procedures, shall provide the following:

(1) **Shelter from sunlight.** When sunlight is likely to cause overheating or discomfort, sufficient shade shall be provided to protect the live rabbits from the direct rays of the sun and such live rabbits shall not be subjected to surrounding air temperatures which exceed 29.5° C. (85° F.), and which shall be measured and read in the manner prescribed in § 3.65 of this part, for a period of more than 45 minutes.

(2) **Shelter from rain or snow.** Live rabbits shall be provided protection to allow them to remain dry during rain or snow.

(3) **Shelter from cold weather.** Transporting devices shall be covered to provide protection for live rabbits when the outdoor air temperature falls below 10° C. (50° F.), and such live rabbits shall not be subjected to surrounding air temperatures which fall below 7.2° C. (45° F.), and which shall be measured and read in the manner prescribed in § 3.65 of this part, for a period of more than 45 minutes unless such rabbits are accompanied by a certificate of acclimation to lower temperatures as prescribed in § 3.60(c).

(b) Care shall be exercised to avoid handling of the primary enclosure in such a manner that may cause physical or emotional trauma to the live rabbit contained therein.

(c) Primary enclosures used to transport any live rabbit shall not be tossed, dropped, or needlessly tilted and shall not be stacked in a manner

9 CFR Ch. I (1-1-90 Edition)**which may reasonably be expected to result in their falling.**

[43 FR 2164, May 16, 1978, as amended at 43 FR 56216, Dec. 1, 1978]

Subpart D—Specifications for the Humane Handling, Care, Treatment, and Transportation of Nonhuman Primates²**FACILITIES AND OPERATING STANDARDS****§ 3.75 Facilities, general.**

(a) **Structural strength.** The indoor and outdoor housing facilities for nonhuman primates shall be structurally sound and shall be maintained in good repair, to protect the animals from injury, to contain the animals, and to restrict the entrance of other animals.

(b) **Water and electric power.** Reliable and adequate electric power, if required to comply with other provisions of this subpart, and adequate potable water shall be available.

(c) **Storage.** Supplies of food and bedding shall be stored in facilities which adequately protect such supplies against infestation or contamination by vermin. Refrigeration shall be provided for supplies of perishable food.

(d) **Waste disposal.** Provision shall be made for the removal and disposal of animal and food wastes, bedding, dead animals, and debris. Disposal facilities shall be so provided and operated as to minimize vermin infestation, odors, and disease hazards.

(e) **Washroom and sinks.** Facilities, such as washrooms, basins, or sinks, shall be provided to maintain cleanliness among animal caretakers.

Animal and Plant Health Inspection Service, USDA**§ 3.78**

[32 FR 3273, Feb. 24, 1967, as amended at 44 FR 63492, Nov. 2, 1979]

§ 3.76 Facilities, indoor.

(a) **Heating.** Indoor housing facilities for nonhuman primates shall be sufficiently heated when necessary to protect the animals from the cold, and to provide for their health and comfort. The ambient temperature shall not be allowed to fall below 50° F.

(b) **Ventilations.** Indoor housing facilities for nonhuman primates shall be adequately ventilated to provide for the health and comfort of the animals at all times. Such facilities shall be provided with fresh air either by means of windows, doors, vents, or air conditioning and shall be ventilated so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or air conditioning, shall be provided when the ambient temperature is 85° F. or higher.

(c) **Lighting.** Indoor housing facilities for nonhuman primates shall have ample light, by natural or artificial means, or both, of good quality and well distributed. Such lighting shall provide uniformly distributed illumination of sufficient light intensity to permit routine inspection and cleaning during the entire working period. Primary enclosures shall be so constructed as to protect the nonhuman primates from excessive illumination.

(d) **Interior surfaces.** The interior building surfaces of indoor housing facilities shall be constructed and maintained so that they are substantially impervious to moisture and may be readily sanitized.

(e) **Drainage.** A suitable method shall be provided to rapidly eliminate excess water from indoor housing facilities. If drains are used, they shall be properly constructed and kept in good repair to avoid foul odors therefrom. If closed drainage systems are used, they shall be equipped with traps and so installed as to prevent any backup of sewage onto the floor of the room.

²Nonhuman primates include a great diversity of forms, ranging from the marmoset weighing only a few ounces, to the adult gorilla, weighing hundreds of pounds. They come from Asia, Africa, and Central and South America, and they live in different habitats. Their nutritional and activity requirements differ as do their social and environmental requirements. As a result, the conditions appropriate for one species do not necessarily apply to another; therefore, discretion must be used in interpreting these standards.

provided to allow all nonhuman primates kept outdoors to protect themselves from the direct rays of the sun.

(b) **Shelter from rain or snow.** Nonhuman primates kept outdoors shall be provided with access to shelter to allow them to remain dry during rain or snow.

(c) **Shelter from cold weather.** Shelter shall be provided for all nonhuman primates kept outdoors to afford comfort and protection to such animals appropriate for the local climatic conditions and the nonhuman primate species concerned.

(d) **Drainage.** A suitable method shall be provided to rapidly eliminate excess water.

§ 3.78 Primary enclosures.

All primary enclosures for nonhuman primates shall conform to the following requirements:

(a) **General.** (1) Primary enclosures shall be structurally sound and maintained in good repair to protect the nonhuman primates from injury, to contain them, and to keep predators out.

(2) Primary enclosures shall be constructed and maintained so as to enable the nonhuman primates to remain dry and clean.

(3) Primary enclosures shall be constructed and maintained so that the nonhuman primates contained therein have convenient access to clean food and water as required in this subpart.

(4) The floors of the primary enclosures shall be so constructed so as to protect the nonhuman primates from injury.

(b) **Space requirements.** (1) Primary enclosures shall be constructed and maintained so as to provide sufficient space to allow each nonhuman primate to make normal postural adjustments with adequate freedom of movement.

(2) Each nonhuman primate housed in a primary enclosure shall be provided with a minimum floor space equal to an area of at least three times the area occupied by such primate when standing on four feet.

§ 3.77 Facilities, outdoor.

(a) **Shelter from sunlight.** When sunlight is likely to cause overexposure or discomfort, sufficient shade shall be provided to protect the nonhuman primate from the direct rays of the sun and shall not be stacked in a manner

§ 3.79**ANIMAL HEALTH AND HUSBANDRY STANDARDS****9 CFR Ch. I (1-1-90 Edition)**

Provided, however, That such enclosures shall be sanitized at least once every 2 weeks in the manner provided in paragraph (b)(3) of this section.

(3) Cages, rooms and hard surfaced pens or runs shall be sanitized either by washing them with hot water (180° F.) and soap or detergent, as in a mechanical cage washer, or by washing all soiled surfaces with a detergent solution followed by a safe and effective disinfectant, or by cleaning all soiled surfaces with live steam. Pens or runs using gravel, sand, or dirt, shall be sanitized by removing the soiled gravel, sand, or dirt and replacing it as necessary.

(c) *Housekeeping.* Premises (buildings and grounds) shall be kept clean and in good repair in order to protect the animals from injury and to facilitate the prescribed husbandry practices set forth in this subpart. Premises shall remain free of accumulations of trash.

(d) *Pest control.* An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained.

§ 3.80 Watering.

If potable water is not accessible to the nonhuman primates at all times, such water shall be offered to them at least twice daily except as might otherwise be required to provide adequate veterinary care. All watering receptacles shall be kept clean and all such receptacles shall be sanitized at least once every 2 weeks.

§ 3.81 Sanitation.

(a) *Cleaning of primary enclosures.* Excreta shall be removed from primary enclosures as often as necessary to prevent contamination of the non-human primates contained therein and to reduce disease hazards and odors. When hosing or flushing methods are used for this purpose, measures shall be taken to prevent animals confined in such enclosures from being wetted involuntarily.

(b) *Sanitization of enclosures.* Prior to the introduction of nonhuman primates into primary enclosures previously occupied by other nonhuman primates, such enclosures shall be sanitized in the manner provided in paragraph (b)(3) of this section.

(2) Primary enclosures for nonhuman primates shall be sanitized often enough to prevent an accumulation of debris or excreta, or a disease hazard:

Animal and Plant Health Inspection Service, USDA**§ 3.85**

Source: Sections 3.85 through 3.91 appear at 42 FR 31587, June 21, 1977, unless otherwise noted.

§ 3.85 Consignments to carriers and intermediate handlers.

(a) Carriers and intermediate handlers shall not accept any live nonhuman primate presented by any dealer, research facility, exhibitor, operator of an auction sale, or other person, or any department, agency, or instrumentality of the United States or any State or local government for shipment, in commerce, more than 4 hours prior to the scheduled departure of the primary conveyance on which it is to be transported. *Provided, however, That the carrier or intermediate handler and any dealer, research facility, exhibitor, operator of an auction sale, or other person, or any department, agency, or instrumentality of the United States or any State or local government may mutually agree to extend the time of acceptance to not more than 6 hours if specific prior scheduling of the animal shipment to destination has been made.*

(b) Any carrier or intermediate handler shall only accept for transportation or transport, in commerce, any live nonhuman primate in a primary enclosure which conforms to the requirements set forth in § 3.86 of the standards: *Provided, however, That any carrier or intermediate handler may accept for transportation or transport, in commerce, any live nonhuman primate consigned by any department, agency, or instrumentality of the United States having laboratory animal facilities or exhibiting animals or any licensed or registered dealer, research facility, exhibitor, or operator of an auction sale, if the consigner furnishes to the carrier or intermediate handler a certificate, signed by the consigner, stating that the primary enclosure complies with § 3.86 of the standards, unless such primary enclosure is obviously defective or damaged and it is apparent that it cannot reasonably be expected to contain the live nonhuman primate without causing suffering or injury to such live nonhuman primate. A copy of such certificate shall accompany the shipment to destination. The certificate shall include the following information:*

Authority: Sections 3.85 through 3.91 issued under secs. 3, 5, 6, 10, 11, 14, 16, 17, 21; 80 Stat. 333, 34 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423 (7 U.S.C. 2123, 2135, 2136, 2140, 2141, 2144, 2146, 2147; 2151); 37 FR 28464, 28477, 38 FR 19141.

(1) Name and address of the consignor;

(2) The number of nonhuman primates in the primary enclosure(s);

(3) A certifying statement (e.g., "I hereby certify that the _____ (number) primary enclosure(s) which are used to transport the animal(s) in this shipment complies (comply) with USDA standards for primary enclosures (9 CFR Part 3."); and

(4) The signature of the consignor.

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nonhuman primate at the animal holding area of the terminal cargo facility. The time, date, and method of each attempted notification and the final notification to the consignee and the name of the person certifying the consignee shall be recorded on the copy of the shipping document retained by the carrier or intermediate handler and on a copy of the shipping document accompanying the animal shipment.

[42 FR 31567, June 21, 1977, as amended at 43 FR 21165, May 16, 1978; 44 FR 63493, Nov. 2, 1979]

§ 3.86 Primary enclosures used to transport live nonhuman primates.

No dealer, research facility, exhibitor, or operator of an auction sale shall offer for transportation or transport, in commerce, any live nonhuman primate in a primary enclosure which does not conform to the following requirements:

(a) Primary enclosures, such as compartments, transport cages, cartons, or crates, used to transport live nonhuman primates shall be constructed in such manner that (1) the structural strength of the enclosure shall be sufficient to contain the live nonhuman primate and to withstand the normal rigors of transportation; (2) the interior of the enclosure shall be free from any protrusions that could be injurious to the live nonhuman primate contained therein; (3) no part of the live nonhuman primate will be exposed outside of the primary enclosure which may cause injury to the animal or to persons who are nearby or who handle the primary enclosure; (4) the openings of such enclosures are easily accessible at all times for emergency removal of the live nonhuman primates; (5) the openings which provide access into the primary enclosure shall be secured with locking devices capable of preventing accidental openings;

(6) except as provided in paragraph (a)(4) of this section, there are ventilation openings located on two opposite walls of the primary enclosure and the ventilation openings on each such wall shall be at least 16 percent of the total surface area of each such wall, or there are ventilation openings located on all four walls of the primary enclosure.

sure and the ventilation openings on each such wall shall be at least 8 percent of the total surface area of each such wall: *Provided, however*, That at least one-third of the total minimum area required for ventilation of the primary enclosure shall be located on the lower one-half of the primary enclosure and at least one-third of the total minimum area required for ventilation of the primary enclosure shall be located on the upper one-half of the primary enclosure; (7) except as provided in paragraph (h) of this section, projecting rims or other devices shall be on the exterior of the outside walls with any ventilation openings to prevent obstruction of the ventilation openings and to provide a minimum air circulation space of 1.9 centimeters (.75 inches) between the primary enclosure and any adjacent cargo or conveyance wall; and (8) except as provided in paragraph (h) of this section, adequate handholds or other devices for lifting shall be provided on the exterior of the primary enclosure to enable the primary enclosure to be lifted without tilting and to ensure that the person handling the primary enclosure will not be in contact with the nonhuman primate.

(b) Live nonhuman primates transported in the same primary enclosure shall be of the same species and maintained in compatible groups. Nonhuman primates which have not reached puberty shall not be transported in the same primary enclosures with adult nonhuman primates other than their dams. Any female nonhuman primate in season (estrus) shall not be transported in the same primary enclosure with any male nonhuman primate.

(c) Primary enclosures used to transport live nonhuman primates shall be large enough to ensure that each animal contained therein has sufficient space to turn about freely in a stance whereby both feet and hands are on the floor and can sit in an upright position: *Provided, however*, That certain larger species may be restricted in their movements according to professionally acceptable standards when such freedom of movement would constitute a danger to the live nonhuman

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primates, their handlers, or other persons.

(d) No more than ten live nonhuman primates shall be transported in a primary enclosure.

(e) Primary enclosures used to transport live nonhuman primates as provided in this section shall have solid bottoms to prevent leakage in shipment and shall be cleaned and sanitized in a manner prescribed in § 3.81 of this part, if previously used. Such primary enclosures shall contain clean litter of a suitable absorbent material, which is safe and nontoxic to nonhuman primates, in sufficient quantity to absorb and cover excreta, unless the nonhuman primates are on wire or other nonsolid floors.

(f) Primary enclosures used to transport live nonhuman primates, except where such primary enclosures are permanently affixed in the animal cargo space of the primary conveyance, shall be clearly marked on top and on one or more sides with the words "Wild Animals" in letters not less than 2.5 centimeters (1 inch) in height, and with arrows or other markings, to indicate the correct upright position of the container.

(g) Documents accompanying the shipment shall be attached in an easily accessible manner to the outside of a primary enclosure which is part of such shipment.

(h) When a primary enclosure is permanently affixed within the animal cargo space of the primary conveyance so that the front opening is the only source of ventilation for such primary enclosure, the front opening shall open directly to the outside or to an unobstructed aisle or passageway within the primary conveyance. Such front ventilation opening shall be at least 90 percent of the total surface area of the front wall of the primary enclosure and covered with bars, wire mesh or smooth expanded metal.

[42 FR 31567, June 21, 1977, as amended at 43 FR 21165, May 16, 1978]

§ 3.88 Food and water requirements.

(a) All live nonhuman primates shall be offered potable water within 4 hours prior to being transported in commerce. Dealers, exhibitors, research facilities and operators of auction sales shall provide potable water to all live nonhuman primates transported in their own primary conveyance at least every 12 hours after such transportation is initiated, and carriers and intermediate handlers shall provide potable water to all live nonhuman primates at least every 12 hours after acceptance for transportation in commerce.

(b) Each live adult nonhuman primate over 1 year of age shall be fed at least once in each 24-hour period. Live nonhuman primates less than 1 year of age shall have food made available to them every 12 hours. The time peri-

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primates, their handlers, or other persons.

(d) No more than ten live nonhuman primates shall be transported in a primary enclosure.

(e) Primary enclosures used to transport live nonhuman primates as provided in this section shall have solid bottoms to prevent leakage in shipment and shall be cleaned and sanitized in a manner prescribed in § 3.81 of this part, if previously used. Such primary enclosures shall contain clean litter of a suitable absorbent material, which is safe and nontoxic to nonhuman primates, in sufficient quantity to absorb and cover excreta, unless the nonhuman primates are on wire or other nonsolid floors.

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(b) Each live adult nonhuman primate over 1 year of age shall be fed at least once in each 24-hour period. Live nonhuman primates less than 1 year of age shall have food made available to them every 12 hours. The time peri-

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ods provided for in this paragraph shall apply to carriers and intermediate handlers after acceptance of any live nonhuman primates for transportation, in commerce, and shall apply to dealers, exhibitors, research facilities, and operators of auction sales who transport live nonhuman primates in their own primary conveyance as soon as possible. No nonhuman primate in obvious physical distress shall be transported in commerce.

(c) Any dealer, research facility, exhibitor or operator of an auction sale offering any live nonhuman primate to any carrier or intermediate handler for transportation in commerce shall affix to the outside of the primary enclosure used for transporting such nonhuman primate, written instructions concerning the food and water requirements of such nonhuman primate while being so transported.

(d) No carrier or intermediate handler shall accept any live nonhuman primate for transportation in commerce unless written instructions concerning the food and water requirements of such nonhuman primate while being so transported is affixed to the outside of its primary enclosure.

§ 3.90 Terminal facilities

Carriers and intermediate handlers shall not commingle live animal shipments with inanimate cargo. All animal holding areas of a terminal facility of any carrier or intermediate handler wherein live animal shipments are maintained shall be cleaned and sanitized in a manner prescribed in § 3.81 of the standards often enough to prevent an accumulation of debris or excrete, to minimize vermin infestation and to prevent a disease hazard. An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained for all animal holding areas. Any animal holding area containing live nonhuman primates shall be provided with fresh air by means of windows, doors, vents, or air conditioning and may be ventilated or air circulated by means of fans, blowers, or an air conditioning system so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or fans or blowers or air conditioning shall be used for any animal holding area containing live nonhuman primates when the air temperature within such animal holding area is 23.9°C. (75°F.) or higher. The air temperature around any live nonhuman primate in any animal holding area shall not be allowed to fall below 7.2°C. (45°F.) nor be allowed to exceed 29.5°C. (85°F.) at any time; *Provided*, however, That no live nonhuman primate shall be sub-

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jected to surrounding air temperatures which exceed 23.9°C. (75°F.) for more than 4 hours at any time. To ascertain compliance with the provisions of this paragraph, the air temperature around any live nonhuman primate shall be measured and read outside the primary enclosure which contains such nonhuman primate at a distance not to exceed 91 meters (3 feet) from any one of the external walls of the primary enclosure and on a level parallel to the bottom of such primary enclosure at a point which approximates half the distance between the top and bottom of such primary enclosure. [43 FR 56216, Dec. 1, 1978]

§ 3.91 Handling.

(a) Carriers and intermediate handlers shall move live nonhuman primates from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance to the animal holding area of the terminal facility as expeditiously as possible. Carriers and intermediate handlers holding any live nonhuman primates in an animal holding area of a terminal facility or in transporting any live nonhuman primate from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance to the animal holding area of the terminal facility, including loading and unloading procedures, shall provide the following:

(1) *Shelter from sunlight*. When sunlight is likely to cause overheating or discomfort, sufficient shade shall be provided to protect the live nonhuman primates from the direct rays of the sun and such live nonhuman primates shall not be subjected to surrounding air temperatures which exceed 29.5°C. (85°F.), and which shall be measured and read in the manner prescribed in § 3.90 of this Part, for a period of more than 45 minutes.

(2) *Shelter from rain or snow*. Live nonhuman primates shall be provided protection to allow them to remain dry during rain or snow.

(3) *Shelter from cold weather*. Transporting devices shall be covered to provide protection for live nonhuman primates when the outdoor air temperature falls below 10°C. (50°F.) and such

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live nonhuman primates shall not be subjected to surrounding air temperatures which fall below 7.2°C. (45°F.), and which shall be measured and read in the manner prescribed in § 3.90 of this part, for a period of more than 45 minutes unless such nonhuman primates are accompanied by a certificate of acclimation to lower temperatures as prescribed in § 3.85(c).

(b) Care shall be exercised to avoid handling of the primary enclosure in such a manner that may cause physical or emotional trauma to the live nonhuman primate contained therein. (c) Primary enclosures used to transport any live nonhuman primate shall not be tossed, dropped, or needlessly tilted and shall not be stacked in a manner which may reasonably be expected to result in their falling. [43 FR 21166, May 16, 1978, as amended at 43 FR 56217, Dec. 1, 1978]

Subpart E—Specifications for the Human Handling, Care, Treatment, and Transportation of Marine Mammals

Authority: Secs. 3, 5, 6, 10, 11, 12, 16, 17, 21, 80 Stat. 351, 352, 353, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 416, 419, 420, 423. (7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2142, 2143, 2144, 2146, 2147, 2151); 37 FR 28464, 28477, 38 FR 19141.

SOURCE: 44 FR 36674, June 22, 1979, unless otherwise noted.

FACILITIES AND OPERATING STANDARDS

§ 3.100 Special considerations regarding compliance and/or variance.

(a) All persons subject to the Animal Welfare Act who maintain or otherwise handle marine mammals in captivity must comply with the provisions of this subpart, except that they may apply for and be granted a variance.¹ by the Deputy Administrator, from one or more specified provisions of § 3.104. The provisions of this Subpart shall not apply, however, in emergency.

¹Written permission from the Deputy Administrator to operate as a licensee or registrant under the Act without being in full compliance with one or more specified provisions of § 3.104.

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cy circumstances where compliance with one or more requirements would not serve the best interest of the marine mammals concerned.

(b) An application for a variance must be made to the Deputy Administrator in writing. The request must include:

- (1) The species and number of animals involved.
- (2) A statement from the attending veterinarian concerning the age and health status of the animals involved, and concerning whether the granting of a variance would be detrimental to the marine mammals involved.
- (3) Each provision of the regulations that is not met.
- (4) The time period requested for a variance.

(5) The specific reasons why a variance is requested and

(6) The estimated cost of coming into compliance, if construction is involved.

(c) After receipt of an application for a variance, the Deputy Administrator may require the submission in writing of a report by two experts recommended by the American Association of Zoological Parks and Aquariums and approved by the Deputy Administrator concerning potential adverse impacts on the animals involved or on other matters relating to the effects of the requested variance on the health and well-being of such marine mammals. Such a report will be required only in those cases when the Deputy Administrator determines that such expertise is necessary to determine whether the granting of a variance would cause a situation detrimental to the health and well-being of the marine mammals involved. The cost of such report is to be paid by the applicant.

(d) Variances granted for facilities because of ill or infirm marine mammals that cannot be moved without placing their well-being in jeopardy, or for facilities within 0.3048 meters (1 foot) of compliance with any space requirement may be granted for up to the life of the marine mammals involved. Otherwise, variances shall be granted for a period not exceeding July 30, 1986. Provided, however, That under circumstances deemed justified

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employees or attendants to supervise the viewing public, or by physical barriers, such as fences, walls, glass partitions, or distance, or both.

(3) Any primary enclosure pool, except for natural seawater pools subject to tidal action, shall be constructed of materials having a nonporous, waterproof finish, which facilitate proper cleaning and disinfection, and shall be maintained in good repair as part of a regular ongoing maintenance program. Any ramps or haul-out areas for primary enclosure pools, and any natural seawater pools subject to tidal action, shall be constructed of materials which facilitate proper cleaning and disinfection and shall be maintained in good repair as part of a regular ongoing maintenance program.

(e) The Deputy Administrator shall deny any application for a variance if he determines that it is not justified under the circumstances or that allowing it will be detrimental to the health and well-being of the marine mammals involved.

(f) Any facility housing marine mammals that does not meet all of the space requirements as of July 30, 1984, must meet all of the requirements by September 28, 1984, or may operate without meeting such requirements until action is taken on an application for a variance if the application is submitted to the Deputy Administrator on or before September 28, 1984.

(g) A research facility may be granted a variance from specified requirements of this subpart when such variance is necessary for research purposes and is fully explained in the experimental design. Any time limitation stated in this section shall not be applicable in such case.

(Secs. 3, 5, 6, 10, 11, 12, 16, 17, 21, 80 Stat. 351, 352, 353, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423, 7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2142, 2143, 2144, 2146, 2147, 2151; 7 CFR 2.17, 2.51, 371.2(d))

§ 3.101 Facilities, general

(1) **Construction requirements.** (a) Indoor and outdoor housing facilities for marine mammals shall be structurally sound and shall be maintained in good repair, to protect the animals from injury, to contain the animals, and to restrict the entrance of unwanted animals.

(2) All marine mammals shall be provided with protection from abuse and harassment by the viewing public by the use of a sufficient number of

employees or attendants to supervise the viewing public, or by physical barriers, such as fences, walls, glass partitions, or distance, or both.

(3) Any primary enclosure pool, except for natural seawater pools subject to tidal action, shall be constructed of materials having a nonporous, waterproof finish, which facilitate proper cleaning and disinfection, and shall be maintained in good repair as part of a regular ongoing maintenance program. Any ramps or haul-out areas for primary enclosure pools, and any natural seawater pools subject to tidal action, shall be constructed of materials which facilitate proper cleaning and disinfection and shall be maintained in good repair as part of a regular ongoing maintenance program.

(4) Facilities which utilize natural water areas, such as tidal basins, bays, or estuaries (subject to natural tide-water action) used for housing marine mammals shall be exempt from the drainage requirements of paragraph (e)(1) of this section, but they must meet the minimum standards with regard to space, depth, and sanitation. The water must be monitored for coliforms and for pH and chemical content, if chemicals are added.

(b) **Water and power supply.** Reliable and adequate sources of water and electric power shall be provided by the facility housing marine mammals. Written contingency plans must be submitted to and approved by Veterinary Services regarding emergency sources of water and electric power in the event of failure of the primary sources, when such failure could reasonably be expected to be detrimental to the good health and well-being of the marine mammals housed therein.

(c) **Drainage.** (1) Adequate drainage shall be provided for all primary enclosure pools and shall be located so that all of the water contained in such pools may be rapidly eliminated when necessary for cleaning the pools or for other purposes. Drainage effluent from primary enclosure pools shall be disposed of in a manner that complies with all applicable Federal, State, and local pollution control laws.

(2) Drainage shall be provided for primary enclosures and areas immediately surrounding pools. Drains shall be located so as to rapidly eliminate excess water (except in pools). Such drainage effluent shall be disposed of in a manner that complies with all applicable Federal, State, and local pollution control laws.

(d) **Storage.** Supplies of food shall be stored in facilities which adequately protect such supplies from deterioration, molding, or contamination by vermin. Refrigerators and freezers shall be used for perishable food. No substances which are known to be or may be toxic or harmful to marine mammals shall be stored or maintained in the marine mammal food storage areas.

(e) **Waste disposal.** Provision shall be made for the removal and disposal of animal and food wastes, dead animals, trash, and debris. Disposal facilities shall be provided and operated in a manner which will minimize vermin infestation, odors, and disease hazards. All waste disposal procedures must comply with all applicable Federal, State, and local laws pertaining to pollution control, protection of the environment, and public health.

(f) **Washroom facilities.** Facilities such as washrooms, basins, showers, or sinks, shall be provided to maintain cleanliness among employees and attendants.

(Secs. 3, 5, 6, 10, 11, 12, 16, 17, 21, 80 Stat. 351, 352, 353, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423, 7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2142, 2143, 2144, 2146, 2147, 2151; 7 CFR 2.17, 2.51, 371.2(d))

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(b) **Ventilation.** Indoor housing facilities shall be ventilated by natural or artificial means to provide a flow of fresh air for the marine mammals and to minimize the accumulation of chlorine fumes, other gases, and objectionable odors. A vertical air space averaging at least 1.83 meters (6 feet) shall be maintained in all primary enclosures housing marine mammals, including pools of water.

(c) **Lighting.** Indoor housing facilities for marine mammals shall have ample lighting, by natural or artificial means, or both, of a quality, distribution, and duration which is appropriate for the species involved. Sufficient lighting must be available to provide uniformly distributed illumination which is adequate to permit routine inspections, observations, and cleaning of all parts of the primary enclosure including any den areas. The lighting shall be designed so as to prevent over-exposure of the marine mammals contained therein to excessive illumination,*

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(2) The water surface of pools in outdoor primary enclosures housing cetaceans and sea otters shall be kept free of ice.

(3) No shoreline or warm water dwelling species of pinnipeds or cetaceans shall be housed in outdoor pools where water temperature cannot be maintained within the temperature range to meet their needs.

(b) **Shelter.** Natural or artificial shelter which is appropriate for the species concerned, when the local climatic conditions are taken into consideration, shall be provided for all marine mammals kept outdoors to afford them protection from the weather or from direct sunlight.

§ 3.104 Space requirements.

(a) **General.** Primary enclosures, including pools of water housing marine mammals, shall comply with the minimum space requirements prescribed by this part. They shall be constructed and maintained so that the animals contained therein are provided with sufficient space, both horizontally and vertically so that they are able to make normal postural and social adjustments with adequate freedom of movement, in or out of the water. An exception to these requirements is provided for in § 3.110, "Veterinary care." Primary enclosures smaller than required by the standards are also allowed to be used for temporary holding purposes such as training and transfer. Such enclosures shall not be used for permanent housing purposes or for periods longer than specified by an attending veterinarian.

(b) **Cetaceans.** Primary enclosures housing cetaceans shall contain a pool of water and may consist entirely of a pool of water. In determining the minimum space required in a pool holding cetaceans, four factors must be satisfied. These are MHD, depth, volume, and surface area. For the purposes of this subpart, cetaceans are divided into Group I cetaceans and Group II cetaceans as shown in Table III in this section.

(1)(1) The water surface of pools in outdoor primary enclosures housing polar bears and ice or cold water dwelling species of pinnipeds shall be kept sufficiently free of solid ice to allow for entry and exit of the animals.

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adult length of the longest species of Group I cetaceans housed therein (as measured in a parallel or horizontal line, from the tip of its upper jaw, or head in the bulbous headed animals, to the notch in the tail fluke), whichever is greater; except that such MHD measurement may be reduced from the most anterior portion of the head in bulbous headed animals, to the notch in the tail fluke*, whichever is greater; except that such MHD measurement may be reduced from the greater number by up to 20 percent if the amount of the reduction is added to the MHD at the 90-degree angle and if the minimum volume and surface area requirements are met based on an MHD of 7.32 meters (24.0 feet) or four times the average adult length of the longest species of Group II cetacean housed therein, whichever is greater.

(ii) Once the required MHD has been satisfied, the pool size may be required to be adjusted to increase the surface area and volume when cetaceans are added. Examples of MHD and volume requirements for Group I cetaceans are shown in Table I, and for Group II cetaceans in Table II.

TABLE I.—GROUP I CETACEANS

Representative average adult lengths		Minimum horizontal dimension (MHD)		Minimum required depth		Volume of water required (or excess) of two cetaceans in cubic meters (feet)	
Meters	Feet	Meters	Feet	Meters	Feet	Cubic meters	feet
1.68	5.5	7.32	24	1.83	6	8.11	284.95
2.29	7.5	7.32	24	1.83	6	5.29	529.87
2.74	9.0	7.32	24	1.83	6	2.15	765.02
3.05	10.0	7.32	24	1.83	6	267.3	942.00
3.51	11.5	7.32	24	1.83	6	35.40	1,245.79
3.66	12.0	7.32	24	1.83	6	38.49	1,356.48
4.27	14.0	8.53	28	2.13	7	60.97	2,154.04
5.49	18.0	10.97	36	2.74	9	129.65	4,578.12
5.64	18.5	11.28	37	2.82	9	140.83	4,970.33
5.79	19.0	11.58	38	2.90	9.50	152.64	5,384.32
6.71	22.0	13.41	44	3.36	11	237.50	8,356.68
6.96	22.5	13.72	45	3.43	11.25	253.42	8,941.64
7.32	24.0	14.63	48	3.66	12	307.99	10,851.84
8.53	28.0	17.07	56	4.27	14	487.78	17,232.32

* All calculations are rounded off to the nearest hundredth in converting the length of cetaceans from feet to meters. 1 foot equals .3048 meter. Due to rounding of meter figures as to the length of the rostrum, the correlation of meters to feet in subsequent calculations of MHD and additional volume of water required per cetacean over two may vary slightly from a cubic foot to meters ratio. Cubic meters is based on 1 cubic foot = 0.0283 cubic meter.

head, then it is measured like other cetaceans, from the tip of the upper jaw to the notch in the tail fluke. Immature males should be anticipated to develop the "tusk" (usually left, incisor tooth) beginning at sexual maturity.

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(a) **Environmental temperatures.** Marine mammals shall not be housed in outdoor facilities unless the air and water temperature ranges which they may encounter during the period they are so housed do not adversely affect their health and comfort. A marine mammal shall not be introduced to an outdoor housing facility until it is acclimated to the air and water temperature ranges which it will encounter therein. The following requirements shall be applicable to all outdoor pools.

(1) The water surface of pools in outdoor primary enclosures housing polar bears and ice or cold water dwelling species of pinnipeds shall be kept sufficiently free of solid ice to allow for entry and exit of the animals.

*Lighting intensity and duration must be consistent with the general well-being and comfort of the animal involved. When possible, it should approximate the lighting conditions encountered by the animal in its natural environment. At no time shall the lighting be such that it will cause the animal discomfort or trauma.

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the most anterior portion of the head (as measured in a parallel or horizontal line, from the tip of its upper jaw, or head in the bulbous headed animals, to the notch in the tail fluke), whichever is greater; except that such MHD measurement may be reduced from the most anterior portion of the head in bulbous headed animals, to the notch in the tail fluke*, whichever is greater; except that such MHD measurement may be reduced from the greater number by up to 20 percent if the amount of the reduction is added to the MHD at the 90-degree angle and if the minimum volume and surface area requirements are met based on an MHD of 7.32 meters (24.0 feet) or four times the average adult length of the longest species of Group II cetacean housed therein, whichever is greater.

(ii) Once the required MHD has been satisfied, the pool size may be required to be adjusted to increase the surface area and volume when cetaceans are added. Examples of MHD and volume requirements for Group I cetaceans are shown in Table I, and for Group II cetaceans in Table II.

(iii) In a pool housing a mixture of Group I and Group II cetaceans, the MHD shall be the largest required for any cetacean housed therein.

(iv) In a pool housing a mixture of Group I and Group II cetaceans, the MHD of a pool for Group II cetaceans shall be 7.32 meters (24.0 feet) or two times the average adult length of the longest species of cetacean to be housed therein (as measured in a parallel or horizontal line from the tip of its upper jaw, or from

(i) The MHD of a pool for Group II cetaceans shall be 7.32 meters (24.0 feet) or four times the average adult length of the longest species of cetacean to be housed therein (as measured in a parallel or horizontal line from the tip of its upper jaw, or from

(1)(1) The required minimum horizontal dimension (MHD) of a pool for Group I cetaceans shall be 7.32 meters (24.0 feet) or two times the average

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TABLE II.—GROUP II CETACEANS

Representative average adult length Meters	Minimum horizontal dimension (MHD)		Minimum required depth		Volume of water required to each additional cetacean in excess of four cubic meters	Cubic meters	Cubic feet	Meters	Feet	Meters	Feet
	Feet	Meters	Feet	Meters							
1.52	5.0	7.32	24	1.83	6	13.28	471.00				
1.68	5.5	7.32	24	1.83	8	16.22	569.81				
1.83	6.0	7.32	24	1.83	8	16.24	678.24				
2.13	7.5	9.53	29	1.93	6	26.07	923.18				
2.29	7.5	9.14	30	1.83	8	30.13	1059.75				
2.44	8.0	9.75	32	1.83	6	34.21	1120.56				
2.59	8.5	10.38	34	1.83	6	38.35	1181.39				
2.74	9.0	10.97	36	1.83	8	43.44	1246.04				

1 Converting cubic feet to cubic meters is based on 1 cubic foot = 0.0283 of a cubic meter.

TABLE III.—AVERAGE ADULT LENGTHS OF MARINE MAMMALS MAINTAINED IN CAPTIVITY 1

Species	Common name		Average adult length In meters	Average adult length In feet	Species	Common name		Average adult length In meters	Average adult length In feet
	In feet	Meters				In feet	Meters		
Group I Cetaceans									
<i>Balaenoptera acutorostrata</i>	Minke whale	9.50	27.9		<i>Delphinus delphis</i>	Common dolphin	1.52	5.0	
<i>Cephalorhynchus commersonii</i>	Bottlenose dolphin	3.96	13.0		<i>Delphinus leucas</i>	Baluga whale	4.27	14.0	
<i>Micromysticetus aculeatus</i>	Narwhale	3.96	13.0		<i>Delphinus delphis</i>	Long-finned pilot whale	5.79	18.0	
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	3.66	12.0		<i>Risso's dolphin</i>	Rasso's dolphin	4.35	14.3	
<i>Grampus griseus</i>	Killer whale	7.32	24.0		<i>Tursiops truncatus</i> (Atlantic)	False killer whale	2.74	9.0	
<i>Orcinus orca</i>					<i>Tursiops truncatus</i> (Pacific)	Bottlenose dolphin	3.05	10.0	
<i>Pseudorca crassidens</i>					<i>Phocoena phocoena</i>	Amazon porpoise	2.44	9.0	
<i>Delphinus delphis</i>					<i>Phocoena phocoena</i>	Harbor porpoise	1.68	5.5	
<i>Feresa attenuata</i>					<i>Phocoena phocoena</i>	Franchimars	1.52	5.0	
<i>Kogia breviceps</i>					<i>Phocoena phocoena</i>	Tucuxi	1.68	5.5	
<i>Kogia simus</i>					<i>Phocoena phocoena</i>	River dolphin	2.44	8.0	
<i>Lagenorhynchus cruciger</i>					<i>Common dolphin</i>	Pygmy killer whale	2.59	9.5	
<i>Lagenorhynchus obliquidens</i>					<i>Common dolphin</i>	Pygmy sperm whale	2.44	9.0	
<i>Lagenorhynchus obscurus</i>					<i>Common dolphin</i>	Dwarf sperm whale	3.98	13.0	
<i>Lissocampus borealis</i>					<i>White-beaked dolphin</i>	Atlantic white-sided dolphin	2.80	9.5	
<i>Neopanacaea macrocephalos</i>					<i>White-beaked dolphin</i>	Humpback dolphin	2.90	9.5	
<i>Delphinops巨es</i>					<i>White-beaked dolphin</i>	White-beaked dolphin	2.29	7.5	
<i>Stenella attenuata</i>					<i>Dusky dolphin</i>	Dusky dolphin	2.74	9.0	
<i>Stenella longirostris</i>					<i>Northern right whale dolphin</i>	Northern right whale dolphin	2.13	7.0	
<i>Stenella coeruleoalba</i>					<i>Finless porpoise</i>	Finless porpoise	1.93	6.0	
<i>Stenella attenuata</i>					<i>Melon-headed whale</i>	Melon-headed whale	2.74	9.0	
<i>Stenella pligopodon</i>					<i>Dell's porpoise</i>	Dell's porpoise	2.00	6.5	
<i>Steno bredanensis</i>					<i>Spinner dolphin</i>	Spinner dolphin	2.13	7.0	
					<i>Sousa</i>	Sousa	2.29	7.5	
					<i>Spotted dolphin</i>	Spotted dolphin	2.29	7.5	
					<i>Rough-toothed dolphin</i>	Rough-toothed dolphin	2.44	8.0	

1 This table contains the species of marine mammals known by the Department to be presently in captivity or that are likely to become so captive in the future. Any one or more species subject to the Animal Welfare Act having aspects of their management which are not included in this table should consult the Deputy Administrator with regard to the average adult length of such animals.

TABLE II.—GROUP II CETACEANS

Species	Common name		Average adult length In meters	Male	Female	Male	Female	In feet	Male	Female	In feet
	In feet	Meters									
Group I Pinnipeds:											
<i>Arcocephalus gazella</i> **	Antarctic Fur Seal	1.80	1.20	5.9	3.9						
<i>Arcocephalus tropicalis</i> **	Antarctic Fur Seal	1.80	1.45	5.9	4.75						
<i>Arcocephalus pusillus</i> **	Antarctic Fur Seal	1.88	1.42	6.0	4.7						
<i>Calotaria ustulata</i> **	Antarctic Fur Seal	2.73	1.83	6.6	4.9						
<i>Eumetopias jubatus</i> **	Antarctic Fur Seal	2.20	1.45	7.0	4.75						
<i>Hydrurga leptonyx</i>	Leopard Seal	2.86	2.40	9.4	7.9						
<i>Mirounga leonina</i> **	Northern Elephant Seal	2.90	3.30	9.5	10.8						
<i>Odonotorrhynchus rosmerinus</i> **	Southern Elephant Seal	3.96	2.49	13.0	12.0						
<i>Otaria flavescens</i> **	Walrus	4.67	2.50	15.2	14.2						
<i>Phoca caspica</i>	South American Sea Lion	3.15	2.60	10.3	8.2						
<i>Phoca fasciata</i>	Capuan Seal	2.40	2.00	7.9	6.5						
<i>Phoca largha</i>	Ribbon Seal	1.45	1.40	4.75	4.6						
<i>Phoca tiumba</i>	Habor Seal	1.75	1.68	5.7	5.5						
<i>Zalophus californianus</i>	California Sea Lion	1.70	1.50	5.6	4.9						
<i>Haliophorus grypus</i> **	Galapagos Seal	2.24	1.75	7.3	5.7						
<i>Phoca abronia</i>	Baikal Seal	2.30	1.95	7.5	6.4						
<i>Phoca groenlandica</i>	Harp Seal	1.85	1.85	5.6	5.6						
<i>Leptonychotes weddelli</i> **	Weddell Seal	2.90	3.15	9.5	10.3						
<i>Ommatophoca rossii</i> **	Cat-tailed Seal	2.21	2.21	7.3	7.3						
Group II Pinnipeds:											
<i>Enhydra lutris</i>	Bearded Seal	1.99	2.13	6.5	7.0						
<i>Cystophora cristata</i>	Ringed Seal	2.33	2.33	7.6	7.6						
<i>Phoca hispida</i>	Hooded Seal	1.35	2.00	8.5	6.6						

NOTE.—** Any Group I animals maintained together will be considered as Group I when the animals maintained together include two or more sexually mature males from species marked with a double asterisk (*) regardless of whether the sexually mature males from the same species.

Species	Common name		Average adult length In meters	Male	Female	In meters	In feet
	In feet	Meters					
Sirenia:							
<i>Dugong dugon</i>	Dugong	3.35	11.0				
<i>Trecheta narwhalus</i>	Narwhal	3.51	11.5				
<i>Mysticetiidae</i>							
<i>Enhydra lutris</i>	Sea Otter	2.44	8.0				

(2) The minimum depth requirement for primary enclosure pools for all cetaceans shall be one-half the average adult length of the longest species to be housed therein, regardless of Group I or Group II classification, or the volume as well as the surface area greater, and can be expressed as $d = L/2$ or 6 feet, whichever is greater. Those parts of the primary enclosure pool which do not meet the minimum depth requirement cannot be included when calculating space requirements for cetaceans.

(3) Pool volume. A pool of water housing cetaceans which satisfies the MHD and which meets the minimum

depth requirement, will have sufficient volume and surface area to hold up to two Group I cetaceans or up to four Group II cetaceans. If additional cetaceans are to be added to the pool, they may have to be adjusted to allow for additional space necessary for such cetaceans. See Tables I, II, and IV for volumes and surface area requirements. The additional volume needed shall be based on the number and kind of cetaceans housed therein and shall be determined in the following manner.

- (i) The minimum volume of water required for up to two Group I cetaceans.

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cetaceans is based upon the following formula:

$$\text{Volume} = \left(\frac{\text{MHD}}{2} \right)^2 \times 3.14 \times \text{depth}$$

When there are more than two Group I cetaceans housed in a primary enclosure,

$$\text{Volume} = \frac{(\text{Average Adult Length})^2}{2} \times 3.14 \times \text{depth}$$

See Table I for required volumes.

(ii) The minimum volume of water required for up to four Group II cetaceans housed in a pool, regardless of Group I or Group II classification, are calculated as follows:

$$\text{Volume} = \left(\frac{\text{MHD}}{2} \right)^2 \times 3.14 \times \text{depth}$$

$$\text{Surface Area} = \left(\frac{\text{average adult body length}}{2} \right)^2 \times 3.14 \times 1.5$$

When there are more than four Group II cetaceans housed in a primary enclosure pool, the additional volume of water required for each additional Group II cetacean in excess of four is based on the following formula:

$$\text{SA} = (1/2)^2 \times 3.14 \times 1.5$$

In a pool containing more than two Group I cetaceans or more than four Group II cetaceans,⁶ the additional surface area, which may be required when animals are added must be calculated for each such animal.

(iii) When a mixture of Group I and Group II cetaceans are to be housed in a pool, the required MHD, depth, and volume must be met. Then the required surface area must be determined for each animal in the pool. The sum of these surface areas must then be compared to the surface area which is obtained by a computation based on the required MHD of the pool.⁷ The larger of the two figures

$$\text{Volume} = \left(\frac{\text{MHD}}{2} \right)^2 \times 3.14 \times \text{depth}$$

Then the volume necessary for the cetaceans to be housed in the pool must be calculated (by obtaining the sum of the volumes required for each animal). If this volume is greater than that obtained by using the MHD and depth figures, then the additional volume required may be added by enlarging the pool in its lateral dimensions or by increasing its depth, or both. The mini-

represents the surface area which is required for a pool housing a mixture of Group I and Group II cetaceans. Pool surfaces where the depth does not meet the minimum requirements parts of the primary enclosure pool which do not meet the minimum depth requirements cannot be included when calculating space requirements for sirenians.

(3) A pool which satisfies the required MHD and depth shall be adequate for one or two sirenians. Volume and surface area requirements for additional animals shall be calculated using the same formula as for Group I cetaceans, except that the figure for depth requirement for sirenians shall be one-half the average adult length or 1.52 meters (5.0 feet), whichever is greater.

(d) **Pinnipeds.** (1) Primary enclosed housing pinnipeds shall contain a pool of water and a dry resting or social activity area that must be close enough to the surface of the water to allow easy access for entering or leaving the pool. For the purposes of this subpart, pinnipeds have been divided into Group I pinnipeds and Group II pinnipeds as shown in Table III in this section. In certain instances some Group I pinnipeds shall be considered as Group II pinnipeds. (See Table III).

(2) The minimum size of the dry resting or social activity area of the primary enclosure for pinnipeds (exclusive of the pool of water) shall be based on the average adult length of each pinniped contained therein, as measured in a horizontal or extended position in a straight line from the tip of its nose to the tip of its tail. The minimum size of the dry resting or social activity area shall be computed using the following methods:

(i) **Group I pinnipeds.** Square the average adult length of each pinniped to be contained in the primary enclosure. Add the figures obtained for each of the pinnipeds in the primary enclosure to determine the dry resting or social activity area required for such pinnipeds. If only a single Group I pinniped is maintained in the primary enclosure, the minimum dry resting or social activity area shall be twice the square of the average adult length of that single Group I pinniped. Examples:

⁶A pool containing up to two Group I cetaceans or up to four Group II cetaceans which meets the required MHD and depth will have the necessary surface area and volume required for the animals contained therein.

⁷Since the MHD represents the diameter of a circle, the surface area based on the

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TABLE IV—MINIMUM SURFACE AREA REQUIRED FOR EACH CETACEAN

Meters	Average adult length of each cetacean		Surface area required for each cetacean Sq meters ¹
	Foot	Sq feet	
1.68	5.5	33.31	33.62
2.13	7.0	53.56	57.70
2.29	7.5	61.15	66.23
2.59	8.5	79.0	85.07
2.74	9.0	88.6	95.38
3.05	10.0	10.94	117.75
3.51	11.5	14.47	158.72
3.66	12.0	15.75	168.56
4.27	14.0	21.44	230.79
5.49	18.0	35.44	381.51
5.64	18.5	37.43	403.00
5.79	19.0	39.49	425.08
6.71	22.0	52.94	569.91
6.86	22.5	55.38	596.11
7.32	24.0	63.01	678.24
8.53	28.0	87.76	923.16

¹Square meter = square feet / 9.08361.

(c) **Sirenians.** Primary enclosures housing sirenians shall contain a pool of water and may consist entirely of a pool of water.

(1) The required MHD of a primary enclosure pool for sirenians shall be two times the average adult length of the longest species of sirenian to be housed therein. Calculations shall be based on the average adult length of such sirenians as measured in a horizontal line from the tip of the muzzle to the notch in the tail fluke of dugongs and from the tip of the muzzle to the most distal point in the rounded tail of the manatee.

(2) The minimum depth requirements for primary enclosure pools for MHD is calculated by use of the following formula:

$$SA = \pi r^2 \times \left(\frac{MHD}{2} \right)^2$$

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If two or more sexually mature males are maintained together in a primary enclosure, the dry resting or social activity area shall be divided into two or more separate areas with sufficient visual barriers (such as fences, rocks, or foliage) to provide relief from aggressive animals.

(iii) **Group II pinnipeds.** List all pinnipeds contained in a primary enclosure by average adult length in descending order from the longest species of pinniped to the shortest species of pinniped. Square the average adult length of each pinniped. Multiply the average adult length squared of the longest pinniped by 1.5, the second longest by 1.4, the third longest by 1.3, the fourth longest by 1.2, and the fifth longest by 1.1, as indicated in the following example. Square the average adult length of the sixth pinniped and each additional pinniped. Add the figures obtained for all the pinnipeds in the primary enclosure to determine the required minimum dry resting or social activity area required for such pinnipeds. If only a single Group II pinniped is maintained in the primary enclosure, the minimum dry resting or social activity area must be computed for a minimum of two pinnipeds.

Example: DRA for 1 Group II pinniped = $\frac{(\text{Average adult length})^2 \times 1.5}{1.4} + (\text{Average adult length})^2 \times 1.5 + (\text{Average adult length})^2 \times 1.4$

^{1st} pinniped (avg. adult length)² × 1.5 = social and ORA required

^{2nd} pinniped (avg. adult length)² × 1.4 = social and ORA required

^{3rd} pinniped (avg. adult length)² × 1.3 = social and ORA required

^{4th} pinniped (avg. adult length)² × 1.2 = social and ORA required

^{5th} pinniped (avg. adult length)² × 1.1 = social and ORA required

Each pinniped over 5 (avg. adult length) = social and ORA required

Total minimum social activity and dry resting area required for all pinnipeds housed in a primary enclosure

(average adult length)² of 1st Group I pinniped + (average adult length)² of 2nd Group I pinniped = Total DRA for two pinnipeds DRA for one pinniped = $2 \times (\text{average adult length of Group I pinniped})^2$

(iv) **Group II pinnipeds.** List all pinnipeds contained in a primary enclosure by average adult length in descending order from the longest species of pinniped to the shortest species of pinniped. Square the average adult length of each pinniped. Multiply the average adult length squared of the longest pinniped by 1.5, the second longest by 1.4, the third longest by 1.3, the fourth longest by 1.2, and the fifth longest by 1.1, as indicated in the following example. Square the average adult length of the sixth pinniped and each additional pinniped. Add the figures obtained for all the pinnipeds in the primary enclosure to determine the required minimum dry resting or social activity area required for such pinnipeds. If only a single Group II pinniped is maintained in the primary enclosure, the minimum dry resting or social activity area must be computed for a minimum of two pinnipeds.

Example: DRA for 1 Group II pinniped = $\frac{(\text{Average adult length})^2 \times 1.5}{1.4} + (\text{Average adult length})^2 \times 1.5 + (\text{Average adult length})^2 \times 1.4$

^{1st} pinniped (avg. adult length)² × 1.5 = social and ORA required

^{2nd} pinniped (avg. adult length)² × 1.4 = social and ORA required

^{3rd} pinniped (avg. adult length)² × 1.3 = social and ORA required

^{4th} pinniped (avg. adult length)² × 1.2 = social and ORA required

^{5th} pinniped (avg. adult length)² × 1.1 = social and ORA required

Each pinniped over 5 (avg. adult length) = social and ORA required

Total minimum social activity and dry resting area required for all pinnipeds housed in a primary enclosure

(average adult length)² of 1st Group I pinniped + (average adult length)² of 2nd Group I pinniped = Total DRA for two pinnipeds DRA for one pinniped = $2 \times (\text{average adult length of Group I pinniped})^2$

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pool of water shall have an MHD of not less than 2.44 meters (8.0 feet) and a surface area of at least 8.33 square meters (96.0 square feet) with a minimum depth of 1.52 meters (5.0 feet) with the exception of any entry and exit area. This size pool shall be adequate for two polar bears. For each additional bear, the surface area of the pool must be increased by 3.72 square meters (40 square feet). In measuring this additional surface area, parts of the pool which do not meet minimum depth cannot be considered. The den shall be at least 1.83 meters (6 feet) in width and depth and not less than 1.52 meters (5 feet) in height. It will be so positioned that the viewing public shall not be visible from the interior of the den. A separate den shall be provided for each adult female of breeding age which is permanently housed in the same primary enclosure with an adult male of breeding age. Female polar bears in traveling acts or shows must be provided a den when pregnancy has been determined.

(f) **Sea otters.** (1) Primary enclosures for sea otters shall consist of a pool of water and a dry resting area. The MHD of the pool of water for sea otters shall be at least three times the average adult length of the sea otter contained therein (measured in a horizontal line from the tip of its nose to the tip of its tail) and the pool shall be not less than .91 meters (3.0 feet) deep. When more than two sea otters are housed in the same primary enclosure

(See Table V).

(2) The minimum dry resting area required for one or two sea otters shall be based on the sea otter's average adult length. The minimum dry resting area for one or two sea otters shall be computed using the following method: Multiply the square of the sea otter's average adult length by 3.14 and then multiply the total by 0.91 meters (3.0 feet). This volume is satisfactory for one or two otters. To calculate the additional volume of water for each additional sea otter above two in a primary enclosure, multiply one-half of the square of the sea otter's average adult length by 3.14, then multiply by 0.91 meters (3.0 feet). (See Table V).

(3) The minimum dry resting area required for one or two sea otters shall be based on the sea otter's average adult length. The minimum dry resting area for one or two sea otters shall be computed using the following method: Square the average adult length of the sea otter and multiply the total by 3.14. When the enclosure is to contain more than two sea otters, the dry resting area for each additional animal shall be computed by multiplying one-half of the sea otter's average adult length by 3.14. Using 1.25 meters or 4.1 feet (the average adult length of a sea otter), the calculations for additional space will result in the following figures:

TABLE V.—ADDITIONAL SPACE REQUIRED FOR EACH SEA OTTER WHEN MORE THAN TWO IN A PRIMARY ENCLOSURE

Average adult length of sea otter Meters	Resting area Feet	Resting area Square meters	Square feet	Pool Volume Cubic meters	Pool Volume Cubic feet
1.25	4.1	1.96	6.44	2.23	79.17

(Sees. 3, 5, 6, 10, 11, 12, 16, 17, 21, 80 Stat. 351, 352, 353, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423; 7 U.S.C. 2133, 2136, 2140, 2141, 2142, 2143, 2144, 2146, 2147, 2151; 7 CFR 2.17, 2.51, 371.2(d)) [44 FR 36874, June 22, 1979, as amended at 45 FR 63261, Sept. 24, 1980; 49 FR 26682, 26685, June 28, 1984; 49 FR 27922, July 9, 1984]

§ 3.105

ANIMAL HEALTH AND HUSBANDRY STANDARDS

§ 3.105 Feeding.

(a) The food for marine mammals shall be wholesome, palatable, and free from contamination, and shall be of sufficient quantity and nutritive value to maintain all of the marine mammals in a state of good health. The diet shall be prepared with consideration for age, species, condition, size, and type of marine mammal being fed. Marine mammals shall be offered food at least once a day, to minimize contamination of the food contained therein. Such food receptacles shall be cleaned and sanitized after each use.

(c) Food, when given to each marine mammal individually, shall be given by an employee or attendant responsible to management who has the necessary knowledge to assure that each marine mammal receives an adequate quantity of food to maintain it in good health. Such employee or attendant is required to have the ability to recognize deviations from a normal state of good health in each marine mammal so that the food intake can be adjusted accordingly. Public feeding shall only be permitted if it is done in the presence and under the supervision of a uniformed employee or attendant. Such employee or attendant must assure that the marine mammals are receiving the proper amount and type of food. Only food supplied by the facility where the marine mammals are kept shall be fed to such mammals by the public.

(d) Food preparation and handling shall be conducted so as to minimize bacterial or chemical contamination and to assure the wholesomeness and nutritive value of the food. Frozen fish or other frozen food shall be stored in freezers which are maintained at a maximum temperature of -18°C. (0°F.). The length of time food is stored and the method of storage, as

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well as the thawing of frozen food, shall be conducted in a manner which will minimize contamination and which will assure that the food retains nutritive value and wholesome quality. The thawed product shall be kept cold or refrigerated until a reasonable time before feeding. All foods shall be fed to the marine mammals within 24 hours following the removal of such foods from the freezers for thawing.

§ 3.106 Water quality.

(a) General. The primary enclosure pool shall not contain water which would be detrimental to the health of the marine mammal contained therein.

(b) *Bacterial standards.* (1) The coliform bacteria count of the primary enclosure pool shall not exceed 1,000 MPN (most probable number) per 100 ml of water. Should a coliform bacterial count exceed 1,000 MPN, two subsequent samples may be taken at 48-hour intervals and averaged with the first sample. If such average count does not fall below 1,000 MPN, then the water in the pool shall be deemed unsatisfactory, and the condition must be corrected immediately.

(2) When the water is chemically treated, the chemicals shall be added so as not to cause harm or discomfort to the marine mammals.

(3) Water samples shall be taken and tested at least weekly for coliform count and at least daily for pH and any chemical additives (e.g. chlorine and copper) that are added to the water to maintain water quality standards. Facilities using natural seawater shall be exempt from pH and chemical testing unless chemicals are added to maintain water quality. However, they are required to test for coliforms. Records must be kept documenting the time when all such samples were taken and the results of the sampling. Records of all such test results shall be maintained by management for a 1-year period and must be made available for inspection purposes on request.

(c) *Salinity.* Primary enclosure pools of water shall be salinized for marine cetaceans as well as for those other marine mammals which require salinized water for their good health and

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(c) Housekeeping. Buildings and grounds, as well as exhibit areas, shall be kept clean and in good repair. Fences shall be maintained in good repair. Primary enclosures housing marine mammals shall not have any loose objects, sharp projections, and/or edges which may cause injury or trauma to the marine mammals contained therein.

(d) Pest control. A safe and effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained. Insecticides or other such chemical agents shall not be applied in a primary enclosure housing marine mammals except when deemed essential by an attending veterinarian.

(e) Sanitation. (1) Animal and food waste in areas other than the primary enclosure of water shall be removed from the primary enclosure at least daily, and more often when necessary to prevent contamination of the marine mammals contained therein and to minimize disease hazards.

(2) Particulate animal and food waste, trash, or debris that enter the primary enclosure pool of water shall be removed as often as necessary to maintain the required water quality and to prevent health hazards to the marine mammals contained therein.

(3) The wall and bottom surfaces of the primary enclosure pool of water shall be cleaned as often as necessary to maintain proper water quality.

(b) *Food preparation areas and food receptacles.* Containers, such as buckets, tubs, and tanks, as well as utensils, such as knives and cutting boards, or any other equipment which has been used for holding, thawing or preparing food for marine mammals shall be cleaned and sanitized after each feeding, if the marine mammals are fed once a day, and at least daily if the marine mammals are fed more than once a day. Kitchens and other food handling areas where animal food is prepared shall be cleaned at least once daily and sanitized at least once every week. Sanitizing shall be accomplished by washing with hot water (82° C., 180° F., or higher) and soap or detergent in a mechanical dishwasher, or by washing all soiled surfaces with a detergent solution followed by a safe and effective disinfectant, or by cleaning all soiled surfaces with live steam. Substances such as cleansers and sanitizing agents, pesticides, and other potentially toxic agents must be stored in properly labeled containers away from food preparation surface areas.

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(a) newly acquired marine mammal must be remedied before it is placed with other resident marine mammals.

(b) Any primary enclosure containing a marine mammal with an infection or contagious disease shall be cleaned and sanitized in the manner prescribed by the attending veterinarian. No additional animals shall be introduced into the primary enclosure prior to such cleaning and sanitizing procedures. Any marine mammal exposed to a diseased animal shall be isolated for observation for an appropriate period of time as determined by the attending veterinarian.

(c) Temporary holding facilities with adequately and properly designed pools, tanks, restraining devices or primary enclosures shall be provided for other purposes such as transfer and training of marine mammals. The enclosure which conforms to the requirements set forth in § 3.113 of the standards. *Provided, however,* That any carrier or intermediate handler may accept for transportation or transport, in commerce, any marine mammal in a primary enclosure which may be less than minimum size in both lateral dimensions and depth when used in special situations when prescribed by the professional staff for temporary usage.

(d) A complete necropsy must be conducted by or under the direct supervision of a veterinarian on all marine mammals that die in captivity. A necropsy report must be prepared by the veterinarian listing all pathologic lesions observed and giving the apparent cause of death. All diagnostic tests conducted on post mortem specimens shall be listed in the report, and the results of each test recorded. The management of the facility, at which the marine mammal died, must maintain these necropsy records for a period of 3 years and present them to Department inspectors when requested.

[44 FR 38874, June 22, 1979, as amended at 54 FR 36163, Aug. 31, 1989]

§ 3.111 [Reserved]

TRANSPORTATION STANDARDS

§ 3.112 Consignments to carriers and intermediate handlers.

(a) Carriers and intermediate handlers shall not accept any marine mammal presented by any dealer, research facility, exhibitor, operator of

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USDA standards for primary enclosures (9 CFR Part 3); and

(4) The signature of the consignor, and date.

(c) Carriers or intermediate handlers whose facilities fail to meet the minimum temperature allowed by the standards may accept for transportation or transport, in commerce, any marine mammal consigned by any department, agency, or instrumentality of the United States or of any State or local government, or by any person including any licensee or registrant under the Act, as well as any private individual) if the consignor furnishes to the carrier or intermediate handler a certificate executed by a veterinarian accredited by this Department pursuant to Part 160 of this title on a specified date which shall not be more than 10 days prior to delivery of such animal for transportation in commerce, stating that such marine mammal is acclimated to air temperatures lower than those prescribed in §§ 3.117 and 3.118. A copy of such certificate shall accompany the shipment to destination. The certificate to include at least the following information:

(1) Name and address of the consignor;

(2) The number of animals in the shipment;

(3) A certifying statement (e.g., "I hereby certify that the animal(s) in this shipment is (are), to the best of my knowledge, acclimated to air temperatures lower than 7.2° C. (45° F.)"); and

(4) The signature of the USDA accredited veterinarian, assigned accreditation number, and date.

(d) Carriers and intermediate handlers shall attempt to notify the consignee at least once in every 6-hour period following the arrival of any marine mammals at the animal holding area of the terminal cargo facility. The time, date, and method of each attempted notification and the final notification to the consignee and the name of the person notifying the consignee shall be recorded on the copy of the shipping document retained by the carrier or intermediate handler and on a copy of the shipping document accompanying the animal shipment.

[44 FR 36874, June 22, 1979, as amended at 44 FR 63493, Nov. 2, 1979]

(4) Primary enclosures used to transport marine mammals.

No dealer, research facility, exhibitor, or operator of an auction sale shall offer for transportation or transport, in commerce, any marine mammal in a primary enclosure which does not conform to the following requirements:

(a) Primary enclosures, which are used to transport marine mammals other than cetaceans and sirenians, shall (1) be constructed from materials of sufficient structural strength to contain the marine mammals; (2) be constructed from material that is durable, non toxic, and cannot be chewed and/or swallowed; (3) be able to withstand the normal rigors of transportation; (4) have interiors which are free from any protrusions that could be injurious to the marine mammals contained therein; (5) be constructed so that no parts of the contained marine mammals shall be exposed to the outside of the enclosures in such a way which may cause injury to the animals or to persons who are nearby or who handle the enclosures; (6) have openings which provide access to the enclosures which shall be secured with locking devices of a type which cannot be accidentally opened; (7) have such openings located in a manner which makes them easily accessible at all times for emergency removal of any live marine mammal contained therein; (8) have air inlets at heights which will provide cross ventilation at all levels (particularly when the marine mammals are in a prone position) and located on all four sides of the enclosures, and such ventilation openings shall be not less than 16 percent of the total surface area of each side of the enclosures; (9) have projecting rims or other devices placed on the ends and sides of any enclosures which have ventilation openings to provide a minimum air circulation space of 1.9 centimeters (0.75 inches) between the enclosures and any adjacent cargo or conveyance wall; and (10) be equipped

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with adequate handholds or other devices on the exterior of the enclosures which shall enable them to be lifted without unnecessary tilting and which will ensure that the persons handling the enclosures will not come in contact with any marine mammal contained therein.

(b) Straps, slings, harnesses, or other devices, if used for body support or restraint, when transporting marine mammals such as cetaceans and sirenians shall (1) be designed so as not to prevent access to such mammals by attendants during transportation for the purpose of administering, in transit care; (2) be equipped with special padding to prevent trauma or injury at critical weight pressure points on the body of the marine mammals; and (3) be capable of keeping the animals from thrashing about and causing injury to themselves or their attendants, and yet be adequately designed so as not to cause injury to the animals.

(c) Primary enclosures used to transport live marine mammals shall be large enough to assure that (1) in the case of polar bears and sea otters, there is sufficient space to turn about freely in a stance whereby all four feet are on the floor and the animal can sit in an upright position and lie in a natural position; (2) In the case of pinnipeds, each animal has sufficient space to lie in a natural position, and (3) in the case of cetaceans and sirenians, each animal has sufficient space for support of its body in slings, harnesses, or other supporting devices, if used (as prescribed in paragraph (b) of this section) without causing injury to such cetaceans or sirenians due to contact with the primary enclosure; Provided, however, That certain species may be restricted in their movements according to professionally acceptable standards when such freedom of movement would constitute a danger to the animals, their handlers, or other persons.

(d) Marine mammals transported in the same primary enclosure shall be of the same species and maintained in compatible groups. Marine mammals which have not reached puberty shall not be transported in the same primary enclosure with adult marine

mammals other than their dams. Separately dependent animals (e.g., sibling, dam, and other members of a family group) must be allowed visual and olfactory contact. Female marine mammals shall not be transported in the same primary enclosure with any mature male marine mammals.

(e) Primary enclosures used to transport marine mammals as provided in this section shall have solid bottoms to prevent leakage in shipment and shall be cleaned and sanitized in a manner prescribed in § 3.107 of the standards, if previously used. Such primary enclosures shall contain clean litter of a suitable absorbent material, which is safe and nontoxic to the marine mammals contained therein. In sufficient quantity to absorb and cover excreta, unless the animals are on wire or other nonsolid floors.

(f) Primary enclosures used to transport marine mammals, except where such primary enclosures are permanently affixed in the animal cargo space of the primary conveyance, shall be clearly marked on top and on one or more sides with the words "Live Animal" or "Wild Animal", whichever is appropriate, in letters not less than 2.5 centimeters (1 inch) in height, and with arrows or other markings, to indicate the correct upright position of the container.

(g) Documents accompanying the shipment shall be attached in an easily accessible manner to the outside of a primary enclosure which is part of such shipment.

(h) When a primary enclosure is permanently affixed within the animal cargo space of the primary conveyance so that the front opening is the only source of ventilation for such primary enclosure, the front opening shall open directly to the outside or to an unobstructed aisle or passageway within the primary conveyance. Such front ventilation opening shall be at least 90 percent of the total surface area of the front wall of the primary enclosure and covered with bars, wire mesh, or smooth expanded metal.

(i) When a primary enclosure is provided, the front opening of the primary enclosure shall be at least 90 percent of the total surface area of the front wall of the primary enclosure and covered with bars, wire mesh, or smooth expanded metal.

(j) Marine mammals shall not be transported for more than a period of 36 hours without being offered food. When an employee or attendant is re-

Animal and Plant Health Inspection Service, USDA**§ 3.116**

§ 3.114 Primary conveyances (motor vehicle, rail, air and marine).

(a) The animal cargo space of primary conveyances used in transporting live marine mammals shall be constructed in a manner which will protect the health and assure the safety and comfort of the marine mammals contained therein at all times.

(b) The animal cargo space shall be constructed and maintained in a manner which will prevent the ingress of engine exhaust fumes and gases in excess of that ordinarily contained in the passenger compartments.

(c) No marine mammal shall be placed in an animal cargo space that does not have a supply of air sufficient for normal breathing for each live animal contained therein, and the primary enclosures shall be positioned in the animal cargo spaces of primary conveyances in such a manner that each marine mammal contained therein shall have access to sufficient air for normal breathing.

(d) Primary enclosures shall be positioned in primary conveyances in such a manner that in an emergency the marine mammals can be removed from the conveyances as soon as possible.

(e) The interiors of animal cargo spaces in primary conveyances shall be kept clean.

(f) Live marine mammals shall not knowingly be transported with any material, substance or device which may be injurious to the health and well-being of such marine mammals unless proper precaution is taken to prevent such injury.

§ 3.115 Food and water requirements.

(a) Those marine mammals which require drinking water shall be offered potable water within 4 hours prior to being transported in commerce or offered for transportation in commerce. Such marine mammals shall be waivered as often as necessary and appropriate to the species involved to prevent excessive dehydration which would jeopardize the good health and well-being of the animals.

(b) Marine mammals shall not be soiled of the hair coat with urine and fecal material. No sea otter in need of veterinary care shall be transported in commerce, unless such transportation

is required to accompany a shipment of marine mammals, as provided in § 3.116 of these standards, such marine mammals shall be fed during transit when necessary to provide for their good health and well-being.

§ 3.116 Care in transit.

(a) An employee or attendant of the shipper or receiver of any marine mammal being transported, in commerce, knowledgeable in the area of marine mammal care, shall accompany cetaceans, sirenians, pinnipeds, and sea otters during periods of transportation to provide for their good health and well-being, to observe such marine mammals and to determine whether they need veterinary care and to obtain any needed veterinary care as soon as possible.

(b) An employee or attendant of the shipper or receiver of cetaceans or sirenians being transported, in commerce, shall provide for such cetaceans and sirenians during periods of transport by (1) keeping the skin moist or preventing the drying of the skin by such methods as intermittent spraying of water or application of a non-toxic emollient, such as lanolin, (2) assuring that the pectoral flippers shall be allowed freedom of movement at all times; (3) making adjustments in the position of such marine mammals when necessary to prevent necrosis of the skin at weight pressure points; and (4) calming such marine mammals to avoid struggling, thrashing, and other unnecessary activity which may cause overheat or physical trauma. No cetacean or sirenian in need of veterinary care shall be transported in commerce, unless such transportation is for the purpose of obtaining such care.

(c) Not less than one-half of the floor area in a primary enclosure used to transport sea otters shall be leak-proof and shall contain sufficient crushed ice or ice water to provide each sea otter contained therein with moisture necessary to allow each sea otter to maintain its hair coat by preventing it from drying and to minimize soiling of the hair coat with urine and fecal material. No sea otter in need of veterinary care shall be transported in commerce, unless such transportation

§ 3.117

is for the purpose of obtaining such care.

(d) Polar bears need not be accompanied by an employee or attendant of the shipper or receiver, unless the period of transportation will exceed 24 hours in duration. During surface transportation, it shall be the responsibility of the carrier to inspect polar bears unaccompanied by an employee or attendant at least every 4 hours to determine whether they need veterinary care and to provide any needed veterinary care as soon as possible. When transported by air, live polar bears unaccompanied by an employee or attendant, shall be inspected by the carrier at least every 4 hours if the animal cargo space is accessible during flight. If the animal cargo space is not accessible during flight, the air carrier shall inspect such live unattended polar bears whenever loaded and unloaded and whenever the animal cargo space is otherwise accessible to determine whether such unattended live animals need veterinary care, and the carrier shall provide any needed veterinary care as soon as possible. No polar bear in need of veterinary care shall be transported in commerce, unless such transportation is for the purpose of obtaining such care.

(e) Wild or otherwise dangerous marine mammals shall not be taken from their primary enclosure except under extreme emergency conditions and then only by their trainer or other person who is capable of handling such mammals safely.

[Ses. 3, 5, 6, 10, 11, 12, 16, 17, 21, 80 Stat. 351, 352, 353, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423; 7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2142, 2143, 2144, 2146, 2147, 2151; 7 CFR 2.17, 2.51, 371.2(d)]

[44 FR 36874, June 22, 1979, as amended at 49 FR 26686, June 28, 1984]

§ 3.117 Terminal facilities.

Carriers and intermediate handlers shall not commingle marine mammal shipments with inanimate cargo. All animal holding areas of a terminal facility of any carrier or intermediate handler wherein marine mammal shipments are maintained shall be cleaned and sanitized in a manner prescribed in § 3.107 of the standards often enough to prevent an accumulation of

9 CFR Ch. I (1-1-90 Edition)**Animal and Plant Health Inspection Service, USDA****§ 3.125**

debris or excrets, to minimize vermin infestation, and to prevent a disease hazard. An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained for all animal holding areas. Any animal holding area containing marine mammals shall be provided with fresh air by means of windows, door, vents, or air conditioning and may be ventilated or air circulated by means of fans, blowers, or an air conditioning system so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or fans or blowers or air conditioning shall be used for any animal holding area containing marine mammals when the air temperature within such animal holding area is 23.9° C. (75° F.) or higher. The air temperature around any marine mammal, in any animal holding area shall not be allowed to fall below 7.2° C. (45° F.), and the air temperature around any polar bear shall not be allowed to exceed 29.5° C. (85° F.) at any time and no polar bear shall be subjected to surrounding air temperatures which exceed 23.9° C. (75° F.) for more than 4 hours at any time. To ascertain compliance with the provisions of this paragraph, the air temperature around any marine mammal shall be measured and read outside the primary enclosure which contains such animal at a distance not to exceed 91 meters (3 feet) from any one of the external walls of the primary enclosure and on a level parallel

to the bottom of such primary enclosure at a point which approximates half the distance between the top and bottom of such primary enclosure. [Ses. 3, 5, 6, 10, 11, 12, 16, 17, 21, 80 Stat. 351, 352, 353, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423; 7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2142, 2143, 2144, 2146, 2147, 2151; 7 CFR 2.17, 2.51, 371.2(d)]

[44 FR 36874, June 22, 1979, as amended at 49 FR 26686, June 28, 1984]

§ 3.118 Handling.

(a) Carriers and intermediate handlers shall move marine mammals from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance and from the primary holding area of a terminal facility or in transporting any marine mammal from the animal holding area of the terminal facility to the primary conveyance to the animal holding area of the terminal facility, including loading and unloading procedures, shall provide the following:

(1) *Shelter from sunlight.* When sunlight is likely to cause overheating or discomfort, sufficient shade shall be provided to protect the marine mammals from the direct rays of the sun and such marine mammals shall not be subjected to surrounding air temperatures which exceed 29.5° C. (85° F.), and which shall be measured and read in the manner prescribed in § 3.117 of this part, for a period of more than 45 minutes.

(2) *Shelter from cold weather.* Transporting devices shall be covered to provide protection for marine mammals when the outdoor air temperature falls below 10° C. (50° F.) and such marine mammals shall not be subjected to surrounding air temperatures which fall below 7.2° C. (45° F.), and which shall be measured and read in the manner prescribed in § 3.117 of this part, for a period of more than 45 minutes, unless such animals are accompanied by a certificate of acclimation to lower temperatures as prescribed in § 3.112(c).

(b) Care shall be exercised to avoid handling of the primary enclosure in such a manner that may cause physical or emotional trauma to the marine mammal contained therein.

(c) Primary enclosures used to trans-

port any marine mammal shall not be tossed, dropped, or needlessly tilted and shall not be stacked in a manner which may reasonably be expected to result in their falling. [Ses. 3, 5, 6, 10, 11, 12, 16, 17, 21, 80 Stat. 351, 352, 353, 84 Stat. 1561, 1562, 1563, 1564, 90 Stat. 418, 419, 420, 423; 7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2142, 2143, 2144, 2146, 2147, 2151; 7 CFR 2.17, 2.51, 371.2(d)]

[44 FR 36874, June 22, 1979, as amended at 49 FR 26686, June 28, 1984]

§ 3.117 Terminal facilities.

Carriers and intermediate handlers shall not commingle marine mammal shipments with inanimate cargo. All animal holding areas of a terminal facility of any carrier or intermediate handler wherein marine mammal shipments are maintained shall be cleaned and sanitized in a manner prescribed in § 3.107 of the standards often enough to prevent an accumulation of

Subpart F—Specifications for the Humane Handling, Care, Treatment, and Transportation of Warmblooded Animals Other Than Dogs, Cats, Rabbits, Hamsters, Guinea Pigs, Nonhuman Primates, and Marine Mammals

AUTHORITY: 36 Stat. 351, 352, 353, as amended; 7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2142, 2147, 2151.

SOURCE: 36 FR 24925, Dec. 24, 1971, unless otherwise noted. Redesignated at 44 FR 36874, July 22, 1979.

FACILITIES AND OPERATING STANDARDS**§ 3.125 Facilities, general.**

(a) *Structural strength.* The facility must be constructed of such material and of such strength as appropriate for the animals involved. The indoor and outdoor housing facilities shall be structurally sound and shall be maintained in good repair to protect the animals from injury and to contain the animals.

(b) *Water and power.* Reliable and adequate electric power, if required to comply with other provisions of this subpart, and adequate potable water shall be available on the premises.

(c) *Storage.* Supplies of food and bedding shall be stored in facilities which adequately protect such supplies against deterioration, molding, or contamination by vermin. Refrigeration shall be provided for supplies of perishable food.

(d) *Waste disposal.* Provision shall be made for the removal and disposal of animal and food wastes, bedding, dead animals, trash and debris. Disposal facilities shall be so provided and operated as to minimize vermin infestation, odors, and disease hazards. The disposal facilities and any disposal of animal and food wastes, bedding, dead animals, trash, and debris shall comply with applicable Federal, State, and local laws and regulations relating to pollution control or the protection of the environment.

(e) *Washroom and sinks.* Facilities, such as washrooms, basins, showers, or sinks, shall be provided to maintain cleanliness among animal caretakers.

§ 3.126

[36 FR 24925, Dec. 24, 1971. Redesignated at 44 FR 36874, June 22, 1979, and amended at 44 FR 63492, Nov. 2, 1979]

Facilities, indoor.

(a) **Ambient temperatures.** Temperature in indoor housing facilities shall be sufficiently regulated by heating or cooling to protect the animals from the extremes of temperature, to provide for their health and to prevent their discomfort. The ambient temperature shall not be allowed to fall below nor rise above temperatures compatible with the health and comfort of the animal.

(b) **Ventilation.** Indoor housing facilities shall be adequately ventilated by natural or mechanical means to provide for the health and to prevent discomfort of the animals at all times. Such facilities shall be provided with fresh air either by means of windows, doors, vents, fans, or air-conditioning and shall be ventilated so as to minimize drafts, odors, and moisture condensation.

(c) **Lighting.** Indoor housing facilities shall have ample lighting, by natural or artificial means, or both, of good quality, distribution, and duration as appropriate for the species involved. Such lighting shall be uniformly distributed and of sufficient intensity to permit routine inspection and cleaning. Lighting of primary enclosures shall be designed to protect the animals from excessive illumination.

(d) **Drainage.** A suitable method shall be provided to eliminate rapidly excess water from indoor housing facilities. If drains are used, they shall be properly constructed and kept in good repair to avoid foul odors and installed so as to prevent any backup of sewage. The method of drainage shall comply with applicable Federal, State, and local laws and regulations relating to pollution control or the protection of the environment.

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(b) **Shelter from inclement weather.** Natural or artificial shelter appropriate to the local climatic conditions for the species concerned shall be provided for all animals kept outdoors to afford them protection and to prevent discomfort to such animals. Individual animals shall be acclimated before they are exposed to the extremes of the individual climate.

(c) **Drainage.** A suitable method shall be provided to rapidly eliminate excess water. The method of drainage shall comply with applicable Federal, State, and local laws and regulations relating to pollution control or the protection of the environment.

(d) **Space requirements.** Enclosures shall be constructed and maintained so as to provide sufficient space to allow each animal to make normal postural and social adjustments with adequate freedom of movement. Inadequate space may be indicated by evidence of malnutrition, poor condition, debility, stress, or abnormal behavior patterns.

ANIMAL HEALTH AND HUSBANDRY STANDARDS

§ 3.129 Feeding.

(a) The food shall be wholesome, palatable, and free from contamination and of sufficient quantity and nutritive value to maintain all animals in good health. The diet shall be prepared with consideration for the age, species, condition, size, and type of the animal. Animals shall be fed at least once a day except as dictated by hibernation, veterinary treatment, normal fasts, or other professionally accepted practices.

(b) Food, and food receptacles, if used, shall be sufficient in quantity and located so as to be accessible to all animals in the enclosure and shall be placed so as to minimize contamination. Food receptacles shall be kept clean and sanitary at all times. If self-feeders are used, adequate measures shall be taken to prevent molding, contamination, and deterioration or caking of food.

§ 3.130 Watering.

If potable water is not accessible to the animals at all times, it must be provided as often as necessary for the health and comfort of the animal. Frequency of watering shall consider age, species, condition, size, and type of the animal. All water receptacles shall be kept clean and sanitary.

§ 3.131 Sanitation.

(a) **Cleaning of enclosures.** Excreta shall be removed from primary enclosures as often as necessary to prevent contamination of the animals contained therein and to minimize disease hazards and to reduce odors. When enclosures are cleaned by hosing or flushing, adequate measures shall be taken to protect the animals confined in such enclosures from being directly sprayed with the stream of water or wetted involuntarily.

(b) **Sanitation of enclosures.** Subsequent to the presence of an animal with an infectious or transmissible disease, cages, rooms, and hard-surfaced pens or runs shall be sanitized either by washing them with hot water (80 F. at source) and soap or detergent, as in a mechanical washer, or by washing all soiled surfaces with a detergent solution followed by a safe and effective disinfectant, or by cleaning all soiled surfaces with saturated live steam under pressure. Pens or runs using gravel, sand, or dirt, shall be sanitized when necessary as directed by the attending veterinarian.

(c) **Housekeeping.** Premises (buildings and grounds) shall be kept clean and in good repair in order to protect the animals from injury and to facilitate the prescribed husbandry practices set forth in this subpart. Accumulations of trash shall be placed in designated areas and cleared as necessary to protect the health of the animals.

(d) **Pest control.** A safe and effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained.

§ 3.132 Employees.

A sufficient number of adequately trained employees shall be utilized to maintain the professionally acceptable

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[36 FR 24925, Dec. 24, 1971. Redesignated in this subpart. Such practices set forth under § 3.133 Separation.

level of husbandry practices set forth in this subpart. Such practices shall be provided as often as necessary for the health and comfort of the animal. Frequency of watering shall consider age, species, condition, size, and type of the animal. All water receptacles shall be kept clean and sanitary.

§ 3.133 Separation.

Animals housed in the same primary enclosure must be compatible. Animals shall not be housed near animals that interfere with their health or cause them discomfort.

TRANSPORTATION STANDARDS

Authority: Secs. 3, 5, 6, 10, 11, 14, 16, 17, 21; 80 Stat. 353, 84 Stat. 1561, 1562, 1563, 1564; 90 Stat. 418, 419, 420, 423; (7 U.S.C. 2133, 2135, 2136, 2140, 2141, 2144, 2146, 2147, 2151); 37 FR 28464, 28477, 38 FR 19141.

Source: Sections 3.136 through 3.142 appear at 42 FR 31569, June 21, 1977, unless otherwise noted. Redesignated at 44 FR 36874, July 22, 1979.

§ 3.136 Consignments to carriers and intermediate handlers.

(a) Carriers and intermediate handlers shall not accept any live animals presented by any dealer, research facility, exhibitor, operator of an auction sale, or other person, or any department, agency, or instrumentality of the United States or any State or local government for shipment, in commerce, more than 4 hours prior to the scheduled departure of the primary conveyance on which it is to be transported: *Provided, however, That the carrier or intermediate handler and any dealer, research facility, exhibitor, operator of an auction sale, or other person, or any department, agency, or instrumentality of the United States or any State or local government may mutually agree to extend the time of acceptance to not more than 6 hours if specific prior scheduling of the animal shipment to destination has been made.*

(b) Any carrier or intermediate handler shall only accept for transportation or transport, in commerce, any live animal in a primary enclosure which conforms to the requirements set forth in § 3.137 of the standards: *Provided, however, That any carrier or*

Primary conveyances (motor vehicle, rail, air, and marine).

(a) The animal cargo space of primary conveyances used in transporting live animals shall be designed and constructed to protect the health and ensure the safety and comfort of the live animals contained therein at all times.

(b) The animal cargo space shall be constructed and maintained in a manner to prevent the ingress of engine exhaust fumes and gases from the primary conveyance during transportation in commerce.

(c) No live animal shall be placed in an animal cargo space that does not have a supply of air sufficient for normal breathing for each live animal contained therein, and the primary enclosures shall be positioned in the animal cargo space in such a manner that each live animal has access to sufficient air for normal breathing.

(d) Primary enclosures shall be positioned in the primary conveyance in such a manner that in an emergency the live animals can be removed from the primary conveyance as soon as possible.

(e) The interior of the animal cargo space shall be kept clean.

(f) Live animals shall not be transported with any material, substance (e.g., dry ice) or device which may reasonably be expected to be injurious to the health and well-being of the animals unless proper precaution is taken to prevent such injury.

§ 3.139 Food and water requirements.

(a) All live animals shall be offered potable water within 4 hours prior to being transported in commerce. Dealers, exhibitors, research facilities and operators of auction sales shall provide potable water to all live animals transported in their own primary conveyance at least every 12 hours after such transportation is initiated, and carriers and intermediate handlers shall provide potable water to all live animals at least every 12 hours after acceptance for transportation in commerce. Provided, however, That except as directed by hibernation, veterinary treatment or other professionally accepted practices, those live animals which, by common accepted practices,

require watering more frequently shall be so watered.

(b) Each live animal shall be fed at least once in each 24 hour period, except as directed by hibernation, veterinary treatment, normal fasts, or other professionally accepted practices. Those live animals which, by common accepted practice, require feeding more frequently shall be so fed.

(c) A sufficient quantity of food and water shall accompany the live animal to provide food and water for such animals for a period of at least 24 hours, except as directed by hibernation, veterinary treatment, normal fasts, and other professionally accepted practices.

(d) Any dealer, research facility, exhibitor or operator of an auction sale offering any live animal to any carrier or intermediate handler for transportation in commerce shall affix to the outside of the primary enclosure used for transporting such live animal, written instructions concerning the food and water requirements of such animal while being so transported.

(e) No carrier or intermediate handler shall accept any live animals for transportation in commerce unless written instructions concerning the food and water requirements of such animal while being so transported is affixed to the outside of its primary enclosure.

§ 3.140 Care in transit.

(a) During surface transportation, it shall be the responsibility of the driver or other employee to visually observe the live animals as frequently as circumstances may dictate, but not less than once every 4 hours, to assure that they are receiving sufficient air for normal breathing, their ambient temperatures are within the prescribed limits, all other applicable standards are being complied with and to determine whether any of the live animals are in obvious physical distress and to provide any needed veterinary care as soon as possible. When transported by air, live animals shall be visually observed by the carrier as frequently as circumstances may dictate, but not less than once every 4

Animal and Plant Health Inspection Service, USDA

§ 3.142

hours, if the animal cargo space is accessible during flight. If the animal cargo space is not accessible during flight, the carrier shall visually observe the live animals whenever loaded and unloaded and whenever the animal cargo space is otherwise accessible to assure that they are receiving sufficient air for normal breathing, their ambient temperatures are within the prescribed limits, all other applicable standards are being complied with and to determine whether any such live animals are in obvious physical distress. The carrier shall provide any needed veterinary care as soon as possible. No animal in obvious physical distress shall be transported in commerce.

(b) Wild or otherwise dangerous animals shall not be taken from their primary enclosure except under extreme emergency conditions. Provided, however, That a temporary primary enclosure may be used, if available, and such temporary primary enclosure is structurally strong enough to prevent the escape of the animal. During the course of transportation, in commerce, live animals shall not be removed from their primary enclosures unless placed in other primary enclosures or facilities conforming to the requirements provided in this subpart.

§ 3.141 Terminal facilities.

Carriers and intermediate handlers shall not commingle live animal shipments with inanimate cargo. All animal holding areas of a terminal facility of any carrier or intermediate handler wherein live animal shipments are maintained shall be cleaned and sanitized in a manner prescribed in § 3.141 of the standards often enough to prevent an accumulation of debris or excreta, to minimize vermin infestation and to prevent a disease hazard. An effective program for the control of insects, ectoparasites, and avian and mammalian pests shall be established and maintained for all animal holding areas. Any animal holding area containing live animals shall be provided with fresh air by means of windows, doors, vents, or air conditioning and may be ventilated or air circulated by means of fans, blowers, or an air conditioning system so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as exhaust fans and vents or fans or blowers or air conditioning shall be used for any animal holding area containing live animals when the air temperature within such animal holding area is 23.9°C. (75°F.) or higher. The air temperature around any live animal in any animal holding area shall not be allowed to fall below 7.2°C. (45°F.) nor be allowed to exceed 29.5°C. (85°F.) at any time. Provided, however, That no live animal shall be subjected to surrounding air temperature which exceed 23.9°C. (75°F.) for more than 4 hours at any time. To ascertain compliance with the provisions of this paragraph, the air temperature around any live animal shall be measured and read outside the primary enclosure which contains such animal at a distance not to exceed .91 meters (.3 feet) from any one of the external walls of the primary enclosure and on a level parallel to the bottom of such primary enclosure at a point which approximates half the distance between the top and bottom of such primary enclosure.

§ 3.142 Handling.

(a) Carriers and intermediate handlers shall move live animals from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance to the animal holding area of the terminal facility as expeditiously as possible. Carriers and intermediate handlers holding any live animal in an animal holding area of a terminal facility or in transporting any live animal from the animal holding area of the terminal facility to the primary conveyance and from the primary conveyance to the animal holding area of the terminal facility, including loading and unloading procedures, shall provide the following:

(1) *Shelter from sunlight.* When sunlight is likely to cause overheating or discomfort, sufficient shade shall be provided to protect the live animals from the direct rays of the sun and such live animals shall not be subject-



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through July 21, 1990, is established at 400,000 cartons.

Dated: July 11, 1990.

Robert C. Keeney,
Deputy Director, Fruit and Vegetable
Division.

[FR Doc. 80-16554 Filed 7-13-90; 8:45 am]

BILLING CODE 3410-02-44

Animal and Plant Health Inspection Service

9 CFR Part 3

[Docket No. 88-175]

RIN 0579-AA20

Animal Welfare; Guinea Pigs, Hamsters, and Rabbits

AGENCY: Animal and Plant Health Inspection Service, USDA.

ACTION: Final rule.

SUMMARY: We are amending the regulations for the humane handling, care, treatment, and transportation of guinea pigs, hamsters, and rabbits by revising the space requirements for primary enclosures and reinstating requirements concerning the temperature and ventilation in cargo spaces in primary conveyances. These actions are necessary to ensure the humane handling of these animals in transport, to update the regulations, and, in accordance with the 1985 amendments to the Animal Welfare Act (7 U.S.C. 2131 *et seq.*), to make the regulations more consistent with other Federal regulations and guidelines concerning the handling, care, treatment, and transportation of these animals.

EFFECTIVE DATE: This rule shall become effective August 15, 1990.

FOR FURTHER INFORMATION CONTACT:
Dr. Morley Cook, REAC, APHIS, USDA, Room 208, Federal Building, 6505 Belcrest Road, Hyattsville, MD 20782, (301) 436-6491.

SUPPLEMENTARY INFORMATION:

Background

The Animal Welfare regulations (the regulations) are contained in title 9 of the Code of Federal Regulations, chapter 1, subchapter A, parts 1, 2, and 3. Part 1 provides definitions of the terms used in parts 2 and 3. Part 2 sets forth the administrative and institutional responsibilities of regulated persons under the Animal Welfare Act (7 U.S.C. 2131 *et seq.*) (the Act). Part 3 provides specifications for the humane handling, care, treatment, and transportation, by regulated entities, of animals covered by the Act.

Proposals to amend parts 1 and 2 of the regulations were published in the Federal Register on March 31, 1987 (52 FR 10292-10298 Docket No. 84-027, and 52 FR 10298-10322, Docket No. 84-010, respectively). We solicited comments for a 60-day comment period, ending June 1, 1987. The comment period was twice extended, ending on August 27, 1987. We received 7,857 comments, many of which stated that it was difficult to comment upon the proposals to amend parts 1 and 2 independently of our proposal to amend the standards in part 3. In response to comments, we published revised proposals on parts 1 and 2, along with a proposed rule to amend Part 3, on March 15, 1989 (54 FR 10822-10835, Docket No. 88-013; 54 FR 10835-10897, Docket No. 88-014; and 54 FR 10897-10954, Docket No. 87-004, respectively).

We solicited comments on the interrelationship of parts 1 and 2 with part 3 for a 60-day period, ending May 15, 1989. Five thousand five hundred eighty-two comments, received or postmarked by that date, were considered in preparing final rules for parts 1 and 2. (Any that also pertained to part 3, subparts B or C, were also considered in preparing this final rule.) These final rules were published in the Federal Register on August 31, 1989 (54 FR 36112-36123, Docket No. 89-130, and 54 FR 36123-36163, Docket No. 89-131, respectively). We solicited comments on the proposal to amend part 3 for a 120-day period, ending July 13, 1989. Approximately 10,800 comments were received in time to be considered.

This final rule amends the regulations in subparts B and C of part 3, which contain standards for the humane handling, care, treatment, and transportation of guinea pigs and hamsters, and rabbits, respectively. Rulemaking pertaining to subparts A and D of part 3, which contain standards for the humane handling, care, treatment, and transportation of cats and dogs, and primates, respectively, is being undertaken separately.

Subparts B and C are amended in this final rule to revise the space requirements for primary enclosures; to reinstate requirements concerning the temperature and ventilation in cargo spaces in primary conveyances used to transport guinea pigs, hamsters, or rabbits; and to provide that any person who is subject to these regulations is responsible for complying with their requirements. These actions are necessary to ensure the humane handling of guinea pigs, hamsters, and rabbits in transport; to update the regulations; and, in accordance with the 1985 amendments to the Act, to make

the regulations more consistent with other Federal regulations and guidelines concerning the handling, care, treatment, and transportation of these animals.

Public Comments

A relatively small number of the 10,800 comments we received on our proposal to amend part 3 of the regulations concerned subparts B and C, the standards for the humane handling, care, treatment, and transportation of guinea pigs and hamsters, and rabbits. We have considered all of these comments in preparing this final rule. Comments containing suggestions or objections to these amendments are discussed below. In addition to these comments, 158 comments supported the proposed amendments.

Primary Enclosures: Objections To Increased Space

A number of commenters objected, in general, to our proposed increases in floor space and interior cage height for guinea pigs, hamsters, and rabbits.

One hundred and ninety-eight members of the research or scientific community, 5 dealers, and 1 member of the general public said that the increase in height of primary enclosures for guinea pigs is of questionable value. Two hundred and twelve members of the research or scientific community, 9 dealers, and 3 members of the general public said the interior cage height for guinea pigs should remain unchanged.

One hundred and seventy-three members of the research or scientific community, 4 dealers, and 4 members of the general public said there is no scientific justification for increasing the height of primary enclosures for hamsters. One hundred and twelve researchers and 2 dealers said the interior cage height for hamsters should remain unchanged. In addition, 138 members of the research or scientific community maintained that increasing the required minimum floor space for hamsters would not benefit the hamsters' welfare.

Three hundred and five members of the research or scientific community, 2 dealers, and 3 members of the general public said that there is no scientific justification for increasing the height of primary enclosures for rabbits. Twenty members of the research or scientific community, 2 dealers, and 13 members of the general public said space requirements in primary enclosures for rabbits should remain unchanged.

As we noted in the proposed rule (54 FR 10911, March 15, 1989), the space requirements adopted in this rule reflect

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our consultations with other Federal agencies.

The Animal Welfare Act directs the Secretary of Agriculture to— consult and cooperate with other Federal departments, agencies, or instrumentalities concerned with the welfare of animals used for research, experimentation or exhibition, or administration of statutes regulating the transportation in commerce or handling in connection therewith of any animals when establishing standards pursuant to section 2143 of this title and in carrying out the purposes of this chapter.

(7 U.S.C. 2145(a))

In preparing these rules, we consulted with the Department of the Interior, U.S. Fish and Wildlife Service (USFWS), which regulates transportation of wild birds and animals into the United States. The Act also directs the Secretary of Agriculture to "consult with the Secretary of Health and Human Services prior to issuance of regulations" (7 U.S.C. 2145(a)). The Department of Health and Human Services, through the Public Health Service, The National Institutes of Health (NIH), currently issues guidelines on the care and use of animals studied in biomedical research. The guidelines cover dogs and cats, guinea pigs and hamsters, rabbits, and nonhuman primates. These NIH guidelines are in a document entitled "Guide for the Care and Use of Laboratory Animals" (NIH Guide or Guidelines). The NIH Guide is widely accepted by scientific institutions as a primary reference on animal care and use. While the Animal Welfare Act and regulations address a broader range of activities and facilities than the NIH Guide, Congress' intent in requiring consultation with the Department of Health and Human Services is to ensure that, whenever possible, the regulations and the NIH Guidelines are consistent:

The Conference expect the Secretary of Agriculture to have full responsibility for enforcement of the Animal Welfare Act. However, the Conference also recognize that a portion of the nation's research facilities fall under regulation from more than one agency. While the legislative mandate of each agency is different, and they may regulate different aspects of animal care, it is hoped that the agencies continue an open communications to avoid conflicting regulations wherever possible or practice. [sic]

(See Conference Report, Congressional Record of December 17, 1985, at page H1242.)

We have consulted extensively with NIH representatives concerning standards for the humane care, handling, treatment, and transportation of dogs and cats, guinea pigs and hamsters, rabbits, and nonhuman

primates. We have reviewed our existing regulations and the NIH Guidelines. In addition, we have considered comments raised by member agencies of the Interagency Research Animal Committee, which is comprised of Federal agencies that conduct research using animals. We have also consulted with experts and professional organizations and have sought their recommendations on appropriate standards to accomplish our goal. We considered all of this information in proposing the revised space requirements for primary enclosures for guinea pigs, hamsters, and rabbits. These space requirements are substantially identical to the current NIH Guidelines. Based on all of the information available to us, we have determined that these space requirements are appropriate and adequate.

However, there may be circumstances under which alternative space requirements may be acceptable. Therefore, under §§ 3.28(c)(3) and 3.53(c)(3) of this final rule, innovative primary enclosures that do not precisely meet the space requirements of this final rule, but that do provide rabbits, guinea pigs, or hamsters with a sufficient volume of space and the opportunity to express species-typical behavior, may be used at research facilities when approved by the Institutional Animal Care and Use Committee, and by dealers and exhibitors when approved by the Administrator. It should be noted that "Administrator," as used in these regulations, is defined as "the Administrator of the Animal and Plant Health Inspection Service, U.S. Department of Agriculture, or any other official of the Animal and Plant Health Inspection Service to whom authority has been delegated to act in his stead [emphasis added]."

Most commenters opposing the proposed changes also said that the cost of complying with the increase in cage sizes would be prohibitive. Several commenters requested that we continue to allow use of existing cages that meet the current space requirements. We agree that there could be substantial costs involved in replacing cages to satisfy the new space requirements. To ease the financial burden of complying with the new space requirements, the amendments to §§ 3.28(c) and 3.53(c) that increase the minimum space in primary enclosures shall not apply to primary enclosures acquired before the effective date of this final rule. Primary enclosures acquired before that date and meeting the current space requirements may continue to be used until such time as they need to be

replaced because of wear. While we believe that the new space requirements have certain advantages, our review of the rulemaking record and other available information leads us to the conclusion that a comparison of the advantages of increased cage sizes with the costs of compliance strongly suggests that it is appropriate to phase in the new cage size requirements.

Primary Enclosures; Other Comments

Four members of the research or scientific community said that a nursing dwarf hamster and her litter should be allowed to be housed with the father of the litter because male hamsters of this species engage in beneficial paternal behavior. The current regulations do not permit housing of a dwarf hamster and her litter with the father of the litter, or with any other hamsters. We did not propose any change to this provision. Our rationale is twofold: (1) In the absence of other hamsters that could disturb the nursing female and her litter, the incidence of cannibalism is substantially reduced or eliminated; and (2) fighting between male and female adults, which occurs because the female is generally only receptive to the male during the short period of estrus, is prevented.

Three members of the research or scientific community and 4 members of the general public said there should be no reduction in floor space for nursing guinea pigs and their litters. The proposed reduction in floor space for nursing guinea pigs and their litters was based on information supplied by the National Association for Biomedical Research (NABR), which, in May 1987, petitioned us to delete our requirement for additional space for breeder guinea pigs. The two studies cited by NABR in support of its petition were summarized in the proposed rule to amend Part 3. The results of these studies continue to provide a basis for changing our regulations concerning space requirements for breeder guinea pigs, including nursing guinea pigs with litters.

Three members of the general public said that the current limitations on the number of hamsters per primary enclosure should be maintained; and 21 members of the research or scientific community and 1 member of the general public said that we should specify the number of hamsters allowed per primary enclosure based on the weight of the animals. Our proposed rule made no change to § 3.36(d), which provides that not more than 50 live hamsters shall be transported in the same primary enclosure. This provision, coupled with

the requirements concerning cage size, is sufficient to ensure that hamsters have adequate space in primary enclosures used to transport them. We do not believe that specifying a set number of hamsters per primary enclosure, based on the weight of the animals, would serve any useful purpose.

Three members of the general public maintained that we should follow the Guidelines of the Royal Society and Universities Federation for Animal Welfare with respect to floor space for rabbits. These Guidelines recommend more floor space per rabbit than our proposal. Also, 6 members of the research or scientific community, 8 dealers, and 1,021 members of the general public said that rabbit cages need to be large enough to allow normal postural adjustment, including full extension of front and back legs. We have determined that the proposed space requirements for rabbits will provide sufficient room for rabbits to make normal postural adjustments. This includes full extension of front and back legs while lying down.

Temperature Requirements

Two members of the transportation industry objected to the proposed requirements concerning temperature and ventilation in cargo spaces on primary conveyances used to transport guinea pigs, hamsters, or rabbits. The commenters asserted that compliance with these requirements would be impossible because most aircraft in use today do not have mechanical ventilation or cooling systems in cargo compartments. We have made no changes to the proposed rule based on this comment. While many aircraft may not have mechanical ventilation or cooling systems in cargo compartments, data provided to the Federal Aviation Administration by airline manufacturers shows the ambient temperature range in most airline holds to range between 45 and 75 °F (7.2 and 23.9 °C).¹ Auxiliary ventilation would not be required unless the temperature reached 75 °F or higher.

Two members of the general public stated that certificates of acclimation to temperatures lower than 45 °F should not be issued for rabbits. We have made no changes to the proposed rule based on this comment. Except when a certificate of acclimation accompanies live rabbits, the cargo space containing the animals must be at temperatures no lower than 45 °F. While temperatures under 45 °F would not be suitable for

most rabbits, some rabbits are acclimated to cooler temperatures and could be transported in these temperatures without distress. Certificates of acclimation must be issued by veterinarians accredited by the U.S. Department of Agriculture, who certify by that document that the animal is acclimated to temperatures lower than 45 °F.

One member of the research or scientific community said that hamsters can tolerate much colder temperatures than 45 °F, which is normally the minimum temperature permitted in cargo holds in which hamsters are transported. Some hamsters probably can tolerate temperatures below 45 °F. The regulations allow for this by providing that hamsters accompanied by a certificate of acclimation may be transported in cargo holds where the ambient temperature is below 45 °F.

Executive Order 12291 and Regulatory Flexibility Act

The animal welfare regulations are contained in title 9 of the Code of Federal Regulations, chapter 1, subchapter A, parts 1, 2, and 3. Part 1 provides definitions of the terms used in parts 2 and 3. Part 2 describes the administrative and institutional responsibilities of regulated entities. Part 3 contains requirements for the humane handling, care, treatment, and transportation of animals covered by the Animal Welfare Act.

This final rule amends the regulations in part 3, subparts B and C, which contain standards for the humane handling, care, treatment, and transportation of guinea pigs and hamsters, and rabbits, respectively. The amendments revise the space requirements for primary enclosures and reinstate temperature and ventilation requirements for cargo spaces in primary conveyances used to transport guinea pigs, hamsters, and rabbits.

The amendments to part 3, subparts B and C, were proposed in a document published in the Federal Register on March 15, 1989 (54 FR 10297-10954). Docket No. 87-004. This document also contained proposed amendments to part 3, subparts A and D, which contain standards for the humane handling, care, treatment, and transportation of cats and dogs, and nonhuman primates, respectively.

The Department has elected to finalize the amendments to subparts B and C separately. This decision is based on (1) the relatively small number of comments received on these amendments, as compared with the comments received on the proposed amendments to subparts A and D, and

(2) the selection of an implementation plan that minimizes the economic impact of these amendments on regulated entities. As announced in a Federal Register notice published on April 2, 1990 (55 FR 12202-12203, Docket No. 90-007), the Department intends to publish a reproposal for subparts A and D. Parts 1 and 2 of the animal welfare regulations were amended by a final rule published in the Federal Register on August 31, 1989 (54 FR 36112-36163, Docket No. 89-130).

The Department is issuing this final rule for subparts B and C in conformance with Executive Order 12291, the Regulatory Flexibility Act, and Departmental Regulation 1512-1, which require analyses of the economic impact of regulations. Preliminary regulatory impact and regulatory flexibility analyses indicated that all of the proposed amendments to the animal welfare regulations (Parts 1, 2 and 3) taken together would constitute a "major rule" and would have a significant economic impact on a substantial number of small regulated entities.

With respect to the amendments to part 3, subparts B and C, however, the Department is promulgating the regulations in a manner that will minimize, if not eliminate, the economic impact on regulated entities. Specifically, the provisions in revised §§ 3.28 and 3.53 that increase the minimum space required for primary enclosures will not apply to primary enclosures acquired before the effective date of this final rule. Primary enclosures acquired before that date and meeting the current space requirements may continue to be used. Available information indicates that polycarbonate cages normally last from 3 to 6 years, and stainless steel cages over 25 years. Information from industry also indicates that most animal cage manufacturers have adopted size standards for guinea pig, hamster, and rabbit cages that are consistent with the new minimum size requirements in this final rule. Therefore, replacement cages meeting the new space requirements of this final rule will be readily available from commercial sources.

In addition, this final rule will allow use of alternative space arrangements under certain conditions. That is, innovative primary enclosures that do not precisely meet the space requirements of this final rule, but that do provide rabbits, guinea pigs, or hamsters with a sufficient volume of space and opportunity to express species-typical behavior, may be used at research facilities when approved by the

¹ For additional information, contact Dr. Morley Cook, RLAC, APHIS, USDA, Room 206, 6500 Belvoir Road, Hyattsville, MD 20782.

Institutional Animal Care and Use Committee, and by dealers and exhibitors when approved by the Administrator.

These alternatives were developed in response to comments that said the cost of complying with the increase in cage sizes would be prohibitive. The Department believes that the adoption of these alternatives in part 3, subparts B and C, of the animal welfare regulations will minimize any costs to regulated entities which may result from these rules.

The Department does not anticipate any additional compliance costs to be incurred by small intermediate handlers or carriers because of amended temperature and ventilation requirements for cargo spaces in primary conveyances used to transport guinea pigs, hamsters, or rabbits.

The above discussion summarizes the Department's regulatory impact and flexibility analysis concerning the amendments to part 3, subparts B and C. The complete analysis is available for public inspection at USDA, Room 1141, South Building, 14th Street and Independence Avenue, SW., Washington, DC, between 8 a.m. and 4:30 p.m., Monday through Friday, except holidays.

In addition, the Administrator has determined that this rule will not have a significant economic impact on a substantial number of small entities.

Executive Order 12372

This program/activity is listed in the Catalog of Federal Domestic Assistance under No. 10.025 and is subject to Executive Order 12372, which requires intergovernmental consultation with State and local officials. (See 7 CFR part 3035, subpart V.)

Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.), we have submitted the information collection provisions included in this final rule to the Office of Management and Budget (OMB) for approval. Your written comments will be considered if you submit them to the Office of Information and Regulatory Affairs, OMB, Attention: Desk Officer for APHIS, Washington, DC 20503. Please submit a duplicate copy of your comments to the Chief, Regulatory Analysis and Development, PPD, APHIS, USDA, Room 369, Federal Building, 6505 Belcrest Road, Hyattsville, MD 20782.

List of Subjects in 9 CFR Part 3

Animal welfare, Humane animal handling, Pets, Transportation.

Accordingly, we are amending 9 CFR part 3, subparts B and C, as follows:

PART 3—STANDARDS

1. The authority citation for part 3 is revised to read as follows, and the authority citations following all the sections are removed.

Authority: 7 U.S.C. 2131–2156; 7 CFR 2.17, 2.51, and 371.2(d).

2. In § 3.28, the heading for paragraph (b) is revised and a new paragraph (c) is added to read as follows:

§ 3.28 Primary enclosures.

(b) *Space requirements for primary enclosures acquired before August 15, 1990.*

(c) *Space requirements for primary enclosures acquired on or after August 15, 1990.*—(1) *Guinea pigs.* (i) Primary enclosures shall be constructed and maintained so as to provide sufficient space for each guinea pig contained therein to make normal postural adjustments with adequate freedom of movement.

(ii) The interior height of any primary enclosure used to confine guinea pigs shall be at least 7 inches (17.78 cm).

(iii) Each guinea pig shall be provided a minimum amount of floor space in any primary enclosure as follows:

Weight or stage of maturity	Minimum floor space	
	in ²	cm ²
Weaning to 350 grams.....	60	387.12
>350 grams	101	651.65
Nursing females with their litters.....	101	651.65

(2) *Hamsters.* (i) Primary enclosures shall be constructed and maintained so as to provide sufficient space for each hamster contained therein to make normal postural adjustments with adequate freedom of movement.

(ii) The interior height of any primary enclosure used to confine hamsters shall be at least 6 inches (15.24 cm).

(iii) Except as provided in paragraph (c)(2)(iv) of this section, each hamster shall be provided a minimum amount of floor space in any primary enclosure as follows:

Weight	Minimum floor space per hamster	
	in ²	cm ²
<60	<2.1	10
60 to 80	2.1–2.8	13
80 to 100	2.8–3.5	16
		64.52
		83.88
		103.21

Weight	Minimum floor space per hamster	
	m ²	cm ²
>100	>3.5	19
		122.59

(iv) A nursing female hamster, together with her litter, shall be housed in a primary enclosure that contains no other hamsters and that provides at least 121 square inches of floor space: Provided, however, That in the case of nursing female dwarf hamsters such floor space shall be at least 25 square inches.

(3) Innovative primary enclosures that do not precisely meet the space requirements of paragraph (c)(1) or (c)(2) of this section, but that do provide guinea pigs or hamsters with a sufficient volume of space and the opportunity to express species-typical behavior, may be used at research facilities when approved by the Institutional Animal Care and Use Committee, and by dealers and exhibitors when approved by the Administrator.

3. In § 3.36, the introductory text is revised to read as follows:

§ 3.36 Primary enclosures used to transport live guinea pigs and hamsters.

No person subject to the Animal Welfare regulations shall offer for transportation, or transport, in commerce any live guinea pig or hamster in a primary enclosure that does not conform to the following requirements:

4. In § 3.37, a new paragraph (g) is added to read as follows:

§ 3.37 Primary conveyances (motor vehicle, rail, air, and marine).

(g) The animal cargo space of primary conveyances used to transport guinea pigs or hamsters shall be mechanically sound and provide fresh air by means of windows, doors, vents, or air conditioning so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as fans, blowers, or air conditioners, shall be used in any cargo space containing live guinea pigs or hamsters when the ambient temperature in the animal cargo space is 75 °F (23.9 °C) or higher. The ambient temperature within the animal cargo space shall not exceed 85 °F (29.5 °C) or fall below 45 °F (7.2 °C), except that the ambient temperature in the cargo space may be below 45 °F (7.2 °C) for hamsters if the hamsters are accompanied by a certificate of

acclimation to lower temperatures, as provided in § 3.35(c) of this part.

5. In § 3.40, the first two sentences are revised to read as follows:

§ 3.40 Terminal facilities.

No person subject to the Animal Welfare regulations shall commingle shipments of live guinea pigs or hamsters with inanimate cargo. All animal holding areas of a terminal facility where shipments of live guinea pigs or hamsters are maintained shall be cleaned and sanitized as prescribed in § 3.31 of the standards often enough to prevent an accumulation of debris or excreta, to minimize vermin infestation, and to prevent a disease hazard. * * *

6. In § 3.41, the introductory text in paragraph (a) is revised to read as follows:

§ 3.41 Handling.

(a) Any person who is subject to the Animal Welfare regulations and who moves live guinea pigs or hamsters from an animal holding area of a terminal facility to a primary conveyance or vice versa shall do so as quickly and efficiently as possible. Any person subject to the Animal Welfare Act and holding any live guinea pig or hamster in an animal holding area of a terminal facility or transporting any live guinea pig or hamster to or from a terminal facility shall provide the following: * * *

7. In § 3.53, the heading for paragraph (b) is revised and a new paragraph (c) is added to read as follows:

§ 3.53 Primary enclosures.

(b) *Space requirements for primary enclosures acquired before August 15, 1990.*

(c) *Space requirements for primary enclosures acquired on or after August 15, 1990.*

(1) Primary enclosures shall be constructed and maintained so as to provide sufficient space for the animal to make normal postural adjustments with adequate freedom of movement.

(2) Each rabbit housed in a primary enclosure shall be provided a minimum amount of floor space, exclusive of the space taken up by food and water receptacles, in accordance with the following table:

	Individual weights		Minimum floor space		Minimum interior height	
	kg	lbs	m ²	ft ²	cm	in
Individual rabbits (weaned)	<2	<4.4	0.14	1.5	35.56	14
	2-4	4.4-8.8	0.28	3.0	35.56	14
	4-5.4	8.8-11.9	0.37	4.0	35.56	14
	>5.4	>11.9	0.46	5.0	35.56	14

	Weight of nursing female		Minimum floor space/female & litter		Minimum interior height	
	kg	lbs	m ²	ft ²	cm	in
Females with litters	<2	<4.4	0.37	4.0	35.56	14
	2-4	4.4-8.8	0.46	5.0	35.56	14
	4-5.4	8.8-11.9	0.56	6.0	35.56	14
	>5.4	>11.9	0.70	7.5	35.56	14

(3) Innovative primary enclosures that do not precisely meet the space requirements of paragraph (c)(2) of this section, but that do provide rabbits with a sufficient volume of space and the opportunity to express species-typical behavior, may be used at research facilities when approved by the Institutional Animal Care and Use Committee, and by dealers and exhibitors when approved by the Administrator.

8. In § 3.61, the introductory text is revised to read as follows:

§ 3.61 Primary enclosures used to transport live rabbits.

No person subject to the Animal Welfare regulations shall offer for transportation or transport in commerce any live rabbit in a primary enclosure that does not conform to the following requirements:

9. In § 3.62, a new paragraph (g) is added to read as follows:

§ 3.62 Primary conveyances (motor vehicle, rail, air, and marine).

(g) The animal cargo space of primary conveyances used to transport rabbits shall be mechanically sound and provide fresh air by means of windows, doors, vents, or air conditioning so as to minimize drafts, odors, and moisture condensation. Auxiliary ventilation, such as fans, blowers, or air conditioners, shall be used in any cargo space containing live rabbits when the ambient temperature in the animal cargo space is 75 °F (23.9 °C) or higher. The ambient temperature within the animal cargo space shall not exceed 85 °F (29.5 °C) or fall below 45 °F (7.2 °C), except that the ambient temperature in the cargo space may be below 45 °F (7.2 °C) if the rabbits are accompanied by a certificate of acclimation to lower temperatures, as provided in § 3.60(c) of this part.

10. In § 3.65 the first two sentences are revised to read as follows:

§ 3.65 Terminal facilities.

No person subject to the Animal Welfare regulations shall commingle shipments of live rabbits with inanimate cargo. All animal holding areas of a terminal facility where shipments of rabbits are maintained shall be cleaned and sanitized as prescribed in § 3.56 of the standards often enough to prevent an accumulation of debris or excreta, to minimize vermin infestation, and to prevent a disease hazard. * * *

11. In § 3.66, the introductory text in paragraph (a) is revised to read as follows:

§ 3.66 Handling.

(a) Any person who is subject to the Animal Welfare regulations and who moves live rabbits from an animal holding area of a terminal facility to a primary conveyance or vice versa shall do so as quickly and efficiently as possible. Any person subject to the Animal Welfare regulations and holding any live rabbit in an animal holding area of a terminal facility or transporting any

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live rabbit to or from a terminal facility shall provide the following:

Done in Washington, DC, this 11th day of July 1990.

James W. Gossler,
Administrator, Animal and Plant Health Inspection Service.

[FR Doc. 90-1648 Filed 7-13-90; 8:45 am]

BILLING CODE 2410-34-M

FEDERAL DEPOSIT INSURANCE CORPORATION

12 CFR Part 337

Unsafe and Unsound Banking Practices

AGENCY: Federal Deposit Insurance Corporation ("FDIC").

ACTION: Extension of effectiveness of interim rule.

SUMMARY: The Financial Institutions Reform, Recovery, and Enforcement Act of 1989 prohibits an insured depository institution which does not meet applicable minimum capital requirements from accepting funds obtained through any deposit broker. The FDIC may waive the prohibition upon a finding that the acceptance of funds from a deposit broker does not constitute an unsafe or unsound practice with respect to the applicant. The FDIC adopted an interim rule on December 5, 1989, which set forth waiver-application procedures and outlined the circumstances under which a waiver may be granted, implemented a transition period, and clarified terms. The interim rule also requested the comments of interested parties. The interim rule was to remain in effect until June 12, 1990, unless rescinded, amended, modified, or replaced by the FDIC. In a document published June 7, 1990 in the Federal Register, the effectiveness of the interim rule was extended until August 11, 1990. 55 FR 23186 (June 7, 1990). However, the FDIC believes that it requires more time to consider the issues before adopting a final rule. For this reason, this amendment extends the period during which the interim rule remains in effect to November 9, 1990, unless rescinded, amended, modified, or replaced by the FDIC prior to that time.

DATES: This amendment is effective on July 16, 1990. The interim rule published at 54 FR 51012 (Dec. 12, 1989) will remain in effect until November 9, 1990, unless sooner rescinded, amended, modified, or replaced by the FDIC.

FOR FURTHER INFORMATION CONTACT: William G. Hrindac, Examination

Specialist, Division of Supervision, (202) 898-6892, or Alrienne George, Attorney, Legal Division, (202) 898-3859, Federal Deposit Insurance Corporation, 550 17th Street, NW, Washington, DC 20429.

SUPPLEMENTARY INFORMATION:

Paperwork Reduction Act

The collection of information contained in § 337.6(d) of the interim rule has been reviewed and approved by the Office of Management and Budget in accordance with the requirements of the Paperwork Reduction Act (44 U.S.C. 3504(h)) under control number 3064-0099. The information will be collected from undercapitalized insured depository institutions applying for a waiver from the prohibition on the acceptance or renewal of brokered deposits contained in section 29 of the Federal Deposit Insurance Act (12 U.S.C. 1831f).

The estimated annual reporting burden for the collection of information in this interim rule is summarized as follows:

Number of Respondents	370
Number of Responses Per Respondent	1
Total Annual Responses	370
Hours Per Response	6
Total Annual Burden Hours	2,220

Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be directed to the Assistant Executive Secretary (Administration), Room F-400, Federal Deposit Insurance Corporation, Washington, DC 20429, and to the Office of Management and Budget, Paperwork Reduction Project (3064-0099), Washington, DC 20503.

Regulatory Flexibility Act

The FDIC's Board of Directors hereby certifies that the interim rule will not have a significant economic impact on a substantial number of small entities because it largely tracks and clarifies strictures previously established by statute and affords a means by which undercapitalized insured depository institutions may avoid the application of those strictures by applying to the FDIC for a waiver. Moreover, it is anticipated that relatively few small entities will be impacted by the regulation since most insured depository institutions are adequately capitalized or, if undercapitalized, do not utilize brokered deposits. Finally, an entire grouping of undercapitalized institutions, namely, those in FDIC or Resolution Trust Corporation ("RTC") receivership or

conservatorship, have effectively been excluded from the application of the regulation. Consequently, the provisions of the Regulatory Flexibility Act relating to an initial and final regulatory flexibility analysis (5 U.S.C. 603 and 604) are not applicable.

Reason for Adoption Without Prior Notice and Comment

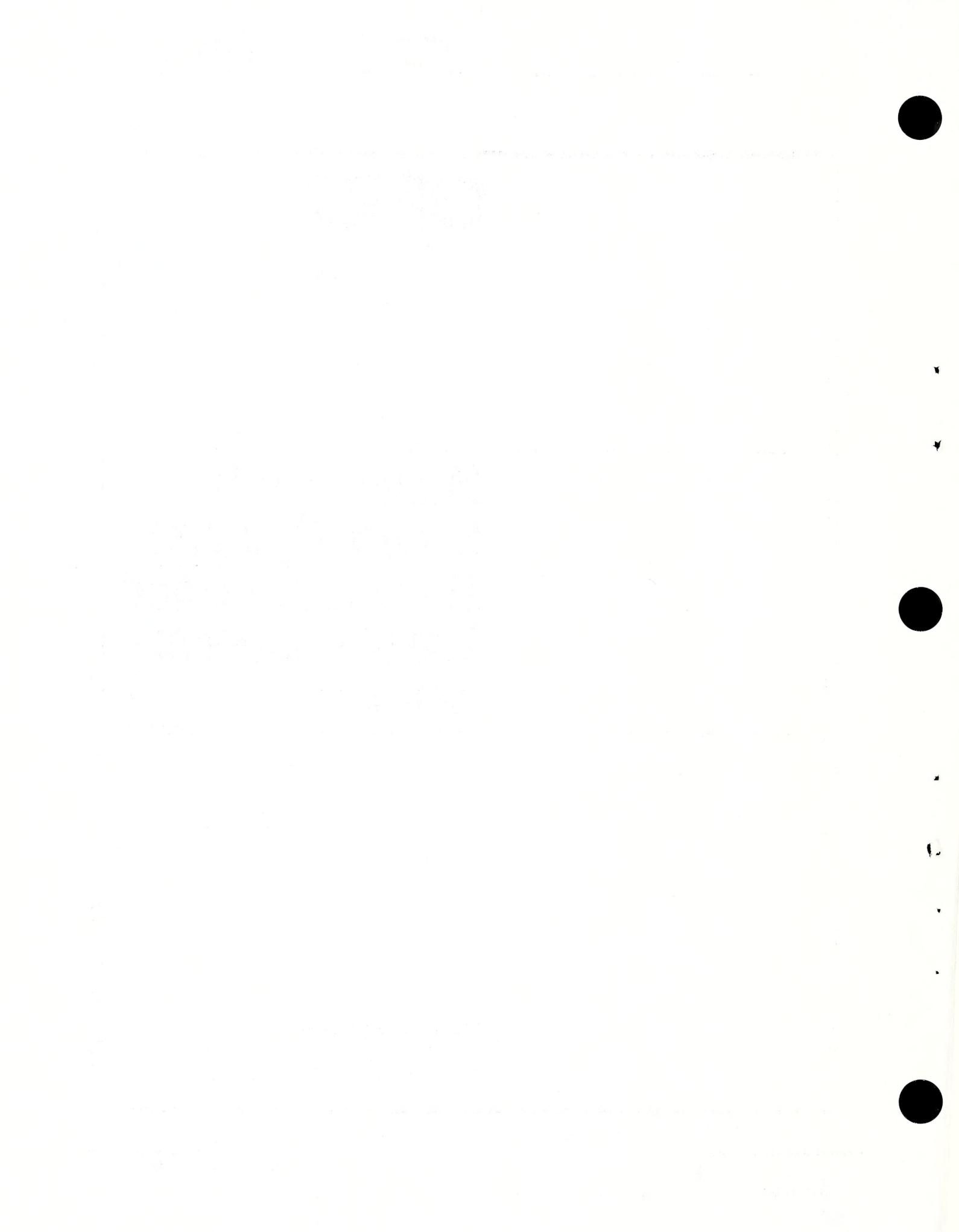
Full notice and comment were provided for the interim rule. Because the sole substantive amendment being made to the interim rule is to extend the period during which the interim rule remains in effect to November 9, 1990, the FDIC Board of Directors has determined that the notice and public participation that are ordinarily required by the Administrative Procedure Act (5 U.S.C. 553) before a regulation may take effect would, in this case, be superfluous and that good cause exists for waiving the customary 30-day delayed effective date.

Background

Section 224 of the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 ("FIRREA") added a new section 29 to the Federal Deposit Insurance ("FDI") Act. Section 29 of the FDI Act prohibits a "troubled" institution from accepting funds obtained directly or indirectly, by or through any deposit broker for deposit into one or more deposit accounts. The term "deposit broker" means "(A) any person engaged in the business of placing deposits, or facilitating the placement of deposits, of third parties with insured depository institutions or the business of placing deposits with insured depository institutions for the purpose of selling interests in those deposits to third parties; and (B) an agent or trustee who establishes a deposit account to facilitate a business arrangement with an insured depository institution to use the proceeds of the account to fund a prearranged loan." FDI Act 29(f)(1). In addition, the term "deposit broker" includes "any insured depository institution, and any employee of any insured depository institution, which engages, directly or indirectly, in the solicitation of deposits by offering rates of interest (with respect to such deposits) which are significantly higher than the prevailing rates of interest on deposits offered by other insured depository institutions having the same type of charter in such depository institution's normal market area." FDI Act 29(f)(3). A "troubled" institution means any insured depository institution which does not

HUMANE ANIMAL CARE AND USE

Exhibit 2a: PHS Policy on Humane Care and Use of Laboratory Animals, revised 1986
Exhibit 2b: NIH Guide for the Care and Use of Laboratory Animals, revised 1985
(see attached)





Public Health Service Policy on Humane Care and Use of Laboratory Animals

Revised as of September 1986

HEALTH RESEARCH EXTENSION ACT OF 1985

PUBLIC LAW 99-158, November 20, 1985

"ANIMALS IN RESEARCH"

"Sec. 495. (a) The Secretary, acting through the Director of NIH, shall establish guidelines for the following:

"(1) The proper care of animals to be used in biomedical and behavioral research.

"(2) The proper treatment of animals while being used in such research. Guidelines under this paragraph shall require—

"(A) the appropriate use of tranquilizers, analgesics, anesthetics, paralytics, and euthanasia for animals in such research; and

"(B) appropriate pre-surgical and post-surgical veterinary medical and nursing care for animals in such research.

Such guidelines shall not be construed to prescribe methods of research.

"(3) The organization and operation of animal care committees in accordance with subsection (b).

"(b)(1) Guidelines of the Secretary under subsection (a)(3) shall require animal care committees at each entity which conducts biomedical and behavioral research with funds provided under this Act (including the National Institutes of Health and the national research institutes) to assure compliance with the guidelines established under subsection (a).

"(2) Each animal care committee shall be appointed by the chief executive officer of the entity for which the committee is established, shall be composed of not fewer than three members, and shall include at least one individual who has no association with such entity and at least one doctor of veterinary medicine.

"(3) Each animal care committee of a research entity shall—

"(A) review the care and treatment of animals in all animal study areas and facilities of the research entity at least semiannually to evaluate compliance with applicable guidelines established under subsection (a) for appropriate animal care and treatment;

"(B) keep appropriate records of reviews conducted under sub-paragraph (A); and

"(C) for each review conducted under subparagraph (A), file with the Director of NIH at least annually (i) a certification that the review has been conducted, and (ii) reports of any violations of guidelines established under subsection (a) or assurances required under paragraph (1) which were observed in such review and which have continued after notice by the committee to the research entity involved of the violations.

(Text continued on the inside of the back cover.)



Public Health Service Policy on Humane Care and Use of Laboratory Animals

Revised as of September 1986

LOCATION OF DOCUMENTS

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SUMMARY

This amended version of the Public Health Service Policy on Humane Care and Use of Laboratory Animals by Awardee Institutions, now entitled Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals, incorporates the changes in the Public Health Service Act (PHS Act) mandated by the Health Research Extension Act of 1985, Public Law 99-158.

The amended Policy also contains various minor editorial changes, including both technical and clarifying amendments to the original Policy. All applications and proposals for award, which are either submitted to the PHS on or after November 1, 1986, or being conducted on or after July 1, 1987, must meet the requirements of the PHS Policy as amended. Institutions which currently have an approved or provisionally-acceptable Animal Welfare Assurance on file with the Office for Protection from Research Risks (OPRR) must submit to OPRR by July 1, 1987, a document in the form of an appendix or amendment which states the changes that the institution has made to conform to the amended Public Health Service Policy.

The most significant changes required by the Health Research Extension Act are:

- The Policy will now apply to research that the Public Health Service (PHS) conducts intramurally.
- The Institutional Animal Care and Use Committee (IAAUC) will be appointed by the Chief Executive Officer of the Institution.
This change is required by Section 495(b)(2) of the PHS Act.

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- The Policy now requires that the program description of the Assurance include an explanation of the training or instruction available to scientists, animal technicians, and other personnel involved in animal care, treatment, or use. The training or instruction must include information on the humane practice of animal care and use and the concept, availability, and use of research or testing methods that minimize the number of animals required to obtain valid results and minimize animal distress. This change is mandated by Section 495(c)(1)(B) of the PHS Act.
- The IACUC now must reevaluate and prepare reports on all of the institution's programs and facilities (including satellite facilities) for activities involving animals at least twice, instead of once, each year. This change is in accordance with Section 495(b)(3)(A) of the PHS Act.
- The IACUC, through the Institutional Official, shall be responsible for reporting requirements. This language change reflects the language used in Section 495(b)(3) of the PHS Act.
- Minority views filed by members of the IACUC must be included in reports filed under IV.F. of this Policy. The last sentence of Section 495(b)(3) of the PHS Act requires this change.

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PUBLIC HEALTH SERVICE (PHS) POLICY ON HUMANE CARE
AND USE OF LABORATORY ANIMALS

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PUBLIC HEALTH SERVICE (PHS) POLICY ON HUMANE CARE
AND USE OF LABORATORY ANIMALS**I. Introduction**

It is the Policy of the Public Health Service (PHS) to require institutions to establish and maintain proper measures to ensure the appropriate care and use of all animals involved in research, research training, and biological testing activities (hereinafter referred to as activities) conducted or supported by the PHS. The PHS endorses the "U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training" developed by the Interagency Research Animal Committee (IRAC). This Policy is intended to implement and supplement those Principles.

II. Applicability and Effective Dates

This Policy is applicable to all PHS-conducted or supported activities involving animals, whether the activities are performed at a PHS agency, an awardee institution, or any other institution and conducted in the United States, the Commonwealth of Puerto Rico, or any territory or possession of the United States. The requirements of this Policy are effective for applications and proposals for PHS research and research training awards involving animals that are submitted for PHS consideration on or after November 1, 1986, and for all PHS-conducted or supported research and research training activities involving animals that are being conducted on or after July 1, 1987. Institutions in foreign countries receiving PHS support for activities involving animals shall comply with this Policy, or provide evidence to the PHS that acceptable standards for the humane care and use of the animals in PHS-conducted or supported activities will be met. No PHS support for an activity involving animals will be provided to an individual unless that individual is affiliated with or sponsored by an institution which can and does assume responsibility for compliance with this Policy, unless the individual makes other arrangements with the PHS. This Policy does not affect applicable state or local laws or regulations which impose more stringent standards for the care and use of laboratory animals. All institutions are required to comply, as applicable, with the Animal Welfare Act, and other Federal statutes and regulations relating to animals.

III. Definitions**A. Animal**

Any live, vertebrate animal used or intended for use in research, research training, experimentation, or biological testing or for related purposes.

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B. Animal Facility

Any and all buildings, rooms, areas, enclosures, or vehicles, including satellite facilities, used for animal confinement, transport, maintenance, breeding, or experiments inclusive of surgical manipulation. A satellite facility is any containment outside of a core facility or centrally designated or managed area in which animals are housed for more than 24 hours.

C. Animal Welfare Act

Public Law 89-544, 1966, as amended, (P.L. 91-579, P.L. 94-279 and P.L. 99-198) 7 U.S.C. 2131 et. seq. Implementing regulations are published in the Code of Federal Regulations (CFR), Title 9, Subchapter A, Parts 1, 2, 3, and 4, and are administered by the U.S. Department of Agriculture.

D. Animal Welfare Assurance or Assurance

The documentation from an institution assuring institutional compliance with this Policy.

E. Guide

Guide for the Care and Use of Laboratory Animals (Guide), HHS, NIH Pub. No. 85-23, 1985 edition or succeeding revised editions.

F. Institution

Any public or private organization, business, or agency (including components of Federal, state, and local governments).

G. Institutional Official

An individual who signs, and has the authority to sign the institution's Assurance, making a commitment on behalf of the institution that the requirements of this Policy will be met.

H. Public Health Service

The Public Health Service or PHS includes the Alcohol, Drug Abuse, and Mental Health Administration; the Centers for Disease Control; the Food and Drug Administration; the Health Resources and Services Administration; the National Institutes of Health; and the Office of the Assistant Secretary for Health, Department of Health and Human Services.

I. Ouorum

A majority of the members of the Institutional Animal Care and Use Committee (IACUC).

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IV. Implementation by InstitutionsA. Animal Welfare Assurance

No activity involving animals may be conducted or supported by the PHS until the institution conducting the activity has provided a written Assurance acceptable to the PHS, setting forth compliance with this Policy. Assurances shall be submitted to the Office for Protection from Research Risks (OPRR), Office of the Director, National Institutes of Health, 9000 Rockville Pike, Building 31, Room 4B09, Bethesda, Maryland 20892. The Assurance shall be typed on the institution's letterhead and signed by the Institutional Official. OPRR will provide the institution with necessary instructions and an example of an acceptable Assurance. All Assurances submitted to the PHS in accordance with this Policy will be evaluated by OPRR to determine the adequacy of the institution's proposed program for the care and use of animals in PHS-conducted or supported activities. On the basis of this evaluation OPRR may approve or disapprove the Assurance, or negotiate an approvable Assurance with the institution. Approval of an Assurance will be for a specified period of time (no longer than five years) after which time the institution must submit a new Assurance to OPRR. OPRR may limit the period during which any particular approved Assurance shall remain effective or otherwise condition, restrict, or withdraw approval. Without an applicable PHS-approved or provisionally-acceptable Assurance no PHS-conducted or supported activity involving animals at the institution will be permitted to continue.

1. Institutional Program for Animal Care and Use

The Assurance shall fully describe the institution's program for the care and use of animals in PHS-conducted or supported activities. The PHS requires institutions to use the Guide for the Care and Use of Laboratory Animals (Guide) as a basis for developing and implementing an institutional program for activities involving animals. The program description must include the following:

- a. a list of every branch and major component of the institution, as well as a list of every branch and major component of any other institution, which is to be included under the Assurance;
- b. the lines of authority and responsibility for administering the program and ensuring compliance with this Policy;
- c. the qualifications, authority, and responsibility of the veterinarian(s) who will participate in the program and the percent of time each will contribute to the program;

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- d. the membership list of the Institutional Animal Care and Use Committee(s)^{1/} (IACUC) established in accordance with the requirements set forth in IV.A.3. of this Policy;
- e. the procedures which the IACUC will follow to fulfill the requirements set forth in this Policy;
- f. the health program for personnel who work in laboratory animal facilities or have frequent contact with animals;
- g. a synopsis of training or instruction in the humane practice of animal care and use, as well as training or instruction in research or testing methods that minimize the number of animals required to obtain valid results and minimize animal distress, offered to scientists, animal technicians, and other personnel involved in animal care, treatment, or use;
- h. the gross square footage of each animal facility (including satellite facilities), the species housed therein and the average daily inventory, by species, of animals in each facility; and
- i. any other pertinent information requested by OPRR.

2. Institutional Status

Each institution must assure that its program and facilities are in one of the following categories:

Category 1 - Accredited by the American Association for Accreditation of Laboratory Animal Care (AAALAC). All of the institution's programs and facilities (including satellite facilities) for activities involving animals have been evaluated and accredited by AAALAC, or another accrediting body recognized by PHS.^{2/} All of the institution's programs and facilities (including satellite facilities) for activities involving animals have also been evaluated by the IACUC and will be reevaluated by the IACUC at least once every six months, in accordance with IV.B.1. and 2. of this Policy, and reports prepared in accordance with IV.B.3. of this Policy.

^{1/} The name Institutional Animal Care and Use Committee (IACUC) as used in this Policy is intended as a generic term for a committee whose function is to ensure that the care and use of animals in PHS-conducted or supported activities is appropriate and humane in accordance with this Policy. However, each institution may identify the committee by whatever name it chooses.

^{2/} As of the issuance date of this Policy, the only accrediting body recognized by PHS is the American Association for Accreditation of Laboratory Animal Care (AAALAC).

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Category 2 - Evaluated by the Institution. All of the institution's programs and facilities (including satellite facilities) for activities involving animals have been evaluated by the IACUC and will be reevaluated by the IACUC at least once every six months, in accordance with IV.B.1. and 2. of this Policy, and reports prepared in accordance with IV.B.3. of this Policy. The initial report of the IACUC evaluation shall be submitted to OPRR with the Assurance.

3. Institutional Animal Care and Use Committee (IACUC)
 - a. The Chief Executive Officer shall appoint an Institutional Animal Care and Use Committee (IACUC), qualified through the experience and expertise of its members to oversee the institution's animal program, facilities, and procedures.
 - b. The Assurance must include the names, position titles, and credentials of the IACUC chairperson and the members. The committee shall consist of not less than five members, and shall include at least:
 - (1) one Doctor of Veterinary Medicine, with training or experience in laboratory animal science and medicine, who has direct or delegated program responsibility for activities involving animals at the institution;
 - (2) one practicing scientist experienced in research involving animals;
 - (3) one member whose primary concerns are in a nonscientific area (for example, ethicist, lawyer, member of the clergy); and
 - (4) one individual who is not affiliated with the institution in any way other than as a member of the IACUC, and is not a member of the immediate family of a person who is affiliated with the institution.
 - c. An individual who meets the requirements of more than one of the categories detailed in IV.A.3.b.(1)-(4) of this Policy may fulfill more than one requirement. However, no committee may consist of less than five members.

B. Functions of the Institutional Animal Care and Use Committee (IACUC)

As an agent of the institution, the IACUC shall with respect to PHS-conducted or supported activities:

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1. review at least once every six months the institution's program for humane care and use of animals, using the Guide as a basis for evaluation;
2. inspect at least once every six months all of the institution's animal facilities (including satellite facilities) using the Guide as a basis for evaluation;
3. prepare reports of the IACUC evaluations conducted as required by IV.B.1. and 2. of this Policy, and submit the reports to the Institutional Official.^{3/} (NOTE: the reports shall be updated at least once every six months upon completion of the required semiannual evaluations and shall be maintained by the institution and made available to OPRR upon request. The reports must contain a description of the nature and extent of the institution's adherence to the Guide and this Policy and must identify specifically any departures from the provisions of the Guide and this Policy, and must state the reasons for each departure. The reports must distinguish significant deficiencies from minor deficiencies. A significant deficiency is one which, consistent with this Policy, and, in the judgment of the IACUC and the Institutional Official, is or may be a threat to the health or safety of the animals. If program or facility deficiencies are noted, the reports must contain a reasonable and specific plan and schedule for correcting each deficiency. If some or all of the institution's facilities are accredited by AAALAC or another accrediting body recognized by PHS, the report should identify those facilities as such.);
4. review concerns involving the care and use of animals at the institution;
5. make recommendations to the Institutional Official regarding any aspect of the institution's animal program, facilities, or personnel training;
6. review and approve, require modifications in (to secure approval) or withhold approval of those components of PHS-conducted or supported activities related to the care and use of animals as specified in IV.C. of this Policy;
7. review and approve, require modifications in (to secure approval), or withhold approval of proposed significant changes regarding the use of animals in ongoing activities; and

^{3/} The Institutional Animal Care and Use Committee (IACUC) may, at its discretion, determine the best means of conducting an evaluation of the institution's programs and facilities. The IACUC may invite ad hoc consultants to assist in conducting the evaluation. However, the IACUC remains responsible for the evaluation and report.

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8. be authorized to suspend an activity involving animals in accordance with the specifications set forth in IV.C.6 of this Policy.

C. Review of PHS-Conducted or Supported Research Projects

1. In order to approve proposed research projects or proposed significant changes in ongoing research projects, the IACUC shall conduct a review of those components related to the care and use of animals and determine that the proposed research projects are in accordance with this Policy. In making this determination, the IACUC shall confirm that the research project will be conducted in accordance with the Animal Welfare Act insofar as it applies to the research project, and that the research project is consistent with the Guide unless acceptable justification for a departure is presented. Further, the IACUC shall determine that the research project conforms with the institution's Assurance and meets the following requirements:
 - a. Procedures with animals will avoid or minimize discomfort, distress, and pain to the animals, consistent with sound research design.
 - b. Procedures that may cause more than momentary or slight pain or distress to the animals will be performed with appropriate sedation, analgesia, or anesthesia, unless the procedure is justified for scientific reasons in writing by the investigator.
 - c. Animals that would otherwise experience severe or chronic pain or distress that cannot be relieved will be painlessly sacrificed at the end of the procedure or, if appropriate, during the procedure.
 - d. The living conditions of animals will be appropriate for their species and contribute to their health and comfort. The housing, feeding, and nonmedical care of the animals will be directed by a veterinarian or other scientist trained and experienced in the proper care, handling, and use of the species being maintained or studied.
 - e. Medical care for animals will be available and provided as necessary by a qualified veterinarian.
 - f. Personnel conducting procedures on the species being maintained or studied will be appropriately qualified and trained in those procedures.
 - g. Methods of euthanasia used will be consistent with the recommendations of the American Veterinary Medical Associa-

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tion (AVMA) Panel on Euthanasia,^{4/} unless a deviation is justified for scientific reasons in writing by the investigator.

2. Prior to the review, each IACUC member shall be provided with a list of proposed research projects to be reviewed. Written descriptions of research projects that involve the care and use of animals shall be available to all IACUC members, and any member of the IACUC may obtain, upon request, full committee review of those research projects. If full committee review is not requested, at least one member of the IACUC, designated by the chairperson and qualified to conduct the review, shall review those research projects and have the authority to approve, require modifications in (to secure approval) or request full committee review of those research projects. If full committee review is requested, approval of those research projects may be granted only after review at a convened meeting of a quorum of the IACUC and with the approval vote of a majority of the quorum present. No member may participate in the IACUC review or approval of a research project in which the member has a conflicting interest (e.g., is personally involved in the project) except to provide information requested by the IACUC; nor may a member who has a conflicting interest contribute to the constitution of a quorum.
3. The IACUC may invite consultants to assist in the review of complex issues. Consultants may not approve or withhold approval of an activity or vote with the IACUC unless they are also members of the IACUC.
4. The IACUC shall notify investigators and the institution in writing of its decision to approve or withhold approval of those activities related to the care and use of animals, or of modifications required to secure IACUC approval. If the IACUC decides to withhold approval of an activity, it shall include in its written notification a statement of the reasons for its decision and give the investigator an opportunity to respond in person or in writing.
5. The IACUC shall conduct continuing review of activities covered by this Policy at appropriate intervals as determined by the IACUC, but not less than once every three years.
6. The IACUC may suspend an activity that it previously approved if it determines that the activity is not being conducted in accordance with applicable provisions of the Animal Welfare Act, the Guide, the institution's Assurance, or IV.C.1.a.-g. of this Policy. The IACUC may suspend an activity only after

^{4/} Journal of the American Veterinary Medical Association (JAVMA), 1986, Vol. 188, No. 3, pp. 252-268, or succeeding revised editions.

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review of the matter at a convened meeting of a quorum of the IACUC and with the suspension vote of a majority of the quorum present.

7. If the IACUC suspends an activity involving animals, the Institutional Official in consultation with the IACUC shall review the reasons for suspension, take appropriate corrective action, and report that action with a full explanation to OPRR.
8. Applications and proposals that have been approved by the IACUC may be subject to further appropriate review and approval by officials of the institution. However, those officials may not approve an activity involving the care and use of animals if it has not been approved by the IACUC.

D. Information Required in Applications and Proposals for Awards Submitted to PHS

1. All Institutions

Applications and proposals (competing and non-competing) for awards submitted to PHS that involve the care and use of animals shall contain the following information:

- a. identification of the species and approximate number of animals to be used;
- b. rationale for involving animals, and for the appropriateness of the species and numbers to be used;
- c. a complete description of the proposed use of the animals;
- d. a description of procedures designed to assure that discomfort and injury to animals will be limited to that which is unavoidable in the conduct of scientifically valuable research, and that analgesic, anesthetic, and tranquilizing drugs will be used where indicated and appropriate to minimize discomfort and pain to animals; and
- e. a description of any euthanasia method to be used.

Non-competing applications and contract proposals for other than full and open competitions need not repeat the information required by IV.D.1.a.-e. if the information was complete in the last competing application or proposal and there are no significant changes to that information. However, the application or proposal must contain a statement to that effect. If there are significant changes in the information, then the application or proposal must specifically identify them and state the reasons for the changes.

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2. Institutions That Have an Approved or Provisionally-Acceptable Assurance

Applications or proposals (competing and non-competing) covered by this Policy from institutions which have an approved or provisionally-acceptable Assurance on file with OPRR shall include verification of approval (including the date of the most recent approval) by the IACUC of those components related to the care and use of animals. With the authorization of PHS, such verification may be filed at a time not to exceed 60 days after submission of applications or proposals.^{5/} If verification of IACUC approval is submitted subsequent to the submission of the application or proposal, the verification shall state the modifications, if any, required by the IACUC. The verification shall be signed by an individual authorized by the institution, but need not be signed by the Institutional Official.

3. Institutions That Do Not Have an Approved or Provisionally-Acceptable Assurance

Applications and proposals covered by this Policy from institutions that do not have an approved or provisionally-acceptable Assurance on file with OPRR shall contain a declaration that the institution will establish an IACUC and submit an Assurance upon request by OPRR. After OPRR has requested the Assurance, the institution shall prepare an Assurance in accordance with IV.A. of this Policy and the established IACUC shall review those components of the application or proposal as required by IV.C. of this Policy. The institution shall then submit to OPRR the Assurance and verification of IACUC approval. The verification shall state the modifications, if any, required by the IACUC. The verification shall be signed by an individual authorized by the institution, but need not be signed by the Institutional Official who signed the Assurance.

E. Recordkeeping Requirements**1. The awardee institution shall maintain:**

- a. an Assurance which has been either approved or deemed provisionally-acceptable by the PHS;

^{5/} Until further notice, PHS hereby authorizes all institutions with approved or provisionally-acceptable Assurances to file verification of IACUC approval either along with the competing application or proposal or within 60 days of submission of the application or proposal. From time to time PHS will re-evaluate this blanket authorization. Any decision to withdraw this authorization will take place only after ample opportunity is provided for comment by the public.

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- b. minutes of IACUC meetings, including records of attendance, activities of the committee, and committee deliberations;
- c. records of applications, proposals, and proposed significant changes in the care and use of animals and whether IACUC approval was given or withheld;
- d. records of semiannual IACUC reports and recommendations (including minority views) as forwarded to the Institutional Official; and
- e. records of accrediting body determinations.

2. All records shall be maintained for at least three years; records that relate directly to applications, proposals, and proposed significant changes in ongoing activities reviewed and approved by the IACUC shall be maintained for the duration of the activity and for an additional three years after completion of the activity. All records shall be accessible for inspection and copying by authorized OPRR or other PHS representatives at reasonable times and in a reasonable manner.

F. Reporting Requirements

1. At least once every 12 months, the IACUC, through the Institutional Official, shall report in writing to OPRR:
 - a. any change in the institution's program or facilities which would place the institution in a different category than specified in its Assurance (see IV.A.2. of this Policy);
 - b. any change in the description of the institution's program for animal care and use as required by IV.A.1.a.-i. of this Policy;
 - c. any changes in the IACUC membership; and
 - d. notice of the dates that the IACUC conducted its semi-annual evaluations of the institution's program and facilities and submitted the evaluations to the Institutional Official.
2. At least once every 12 months, the IACUC, at an institution which has no changes to report as specified in IV.F.1. a.-c. of this Policy, shall submit a letter, through the Institutional Official, to OPRR stating that there are no changes and informing OPRR of the dates of the required IACUC evaluations and submissions to the Institutional Official.

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3. The IACUC, through the Institutional Official, shall promptly provide OPRR with a full explanation of the circumstances and actions taken with respect to:
 - a. any serious or continuing noncompliance with this Policy;
 - b. any serious deviation from the provisions of the Guide; or
 - c. any suspension of an activity by the IACUC.
4. Reports filed under IV.F. of this Policy shall include any minority views filed by members of the IACUC.

V. Implementation by PHS**A. Responsibilities of the Office for Protection from Research Risks (OPRR)**

OPRR is responsible for the general administration and coordination of this Policy and will:

1. request and negotiate, approve or disapprove, and, as necessary, restrict or withdraw approval of Assurances;
2. distribute to executive secretaries of initial review and technical evaluation groups, and to PHS awarding units, lists of institutions that have an approved Assurance;
3. advise awarding units and awardee institutions concerning the implementation of this Policy;
4. evaluate allegations of noncompliance with this Policy;
5. have the authority to review and approve or disapprove waivers to this Policy (see V.D. of this Policy); and
6. conduct site visits to selected institutions.

B. Responsibilities of PHS Awarding Units

PHS awarding units may not make an award for an activity involving animals unless the prospective awardee institution and all other participating institutions have approved or provisionally-acceptable Assurances on file with OPRR, and the awardee institution has provided verification of approval by the IACUC of those components of the application or proposal related to the care and use of animals. If any one of these institutions does not have an approved or provisionally-acceptable Assurance on file with OPRR, the awarding unit will ask OPRR to negotiate an Assurance with the institution(s) before an award is made. No award shall be made until all required Assurances have been submitted by the institution(s), been approved

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or designated provisionally-acceptable by OPRR, and the institution(s) have provided verification of approval by the IACUC of those components of the application or proposal related to the care and use of animals.

C. Conduct of Special Reviews/Site Visits

Each awardee institution is subject to review at any time by PHS staff and advisors, which may include a site visit, in order to assess the adequacy or accuracy of the institution's compliance or expressed compliance with this Policy.

D. Waiver

Institutions may request a waiver of a provision or provisions of this Policy by submitting a request to OPRR. No waiver will be granted unless sufficient justification is provided and the waiver is approved in writing by OPRR.

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INSTRUCTIONS FOR IMPLEMENTATION OF THE
AMENDED PUBLIC HEALTH SERVICE (PHS) POLICY
ON HUMANE CARE AND USE OF LABORATORY ANIMALS

The Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals, incorporating the changes mandated by the Health Research Extension Act of 1985, will become effective November 1, 1986. Institutions which currently have an approved or provisionally-acceptable Animal Welfare Assurance on file with the Office for Protection from Research Risks (OPRR) must submit to OPRR by July 1, 1987, a document in the form of an appendix or amendment which states the changes that the institution has made in order to conform to the amended PHS Policy. These institutions are to begin implementing this Policy as soon as possible and are expected to begin operating under the amended Policy no later than November 1, 1986.

All applications and proposals for award which are either submitted to the PHS on or after November 1, 1986, or being conducted on or after July 1, 1987, must meet the requirements of the PHS Policy as amended. Section IV.D. of the Policy requires all applications and proposals to contain specific information regarding the proposed use of laboratory animals. Applications and proposals submitted to PHS that do not contain the information required in Section IV.D. of this Policy will be considered incomplete and may be deferred for a later review. (The information required by Section IV.D.1. of this Policy should appear in the appropriate component of each application or proposal, for example, Section 2.F. of the PHS Grant Application Form 398.)

Institutions That Have an Approved or Provisionally-Acceptable Assurance

Applications and proposals for award (competing and non-competing) submitted to the PHS must contain verification that the Institutional Animal Care and Use Committee (IACUC) has approved those components of the application or proposal related to the care and use of laboratory animals. PHS prefers that verification of IACUC approval be submitted along with the application or proposal, however, it may be submitted within 60 days of submission of the application or proposal. If verification of IACUC approval is submitted subsequent to the submission of the application or proposal, the verification must state any modifications required by the IACUC.

In the near future, PHS will institute a standardized method for institutional submission of IACUC approval. In the interim, verification of IACUC approval must be submitted via a letter from the institution to the PHS. The letter must be signed by either the Institutional Official who signed the institution's Animal Welfare Assurance or by another individual authorized by the institution to provide verification of IACUC approval.

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The following example may be used in preparing such letters of verification:

EXAMPLE OF ACCEPTABLE VERIFICATION LETTER

Date

Division of Research Grants*
National Institutes of Health
5333 Westbard Avenue
Westwood Building, Room 240
Bethesda, MD 20205

Dear Sir:

The following application submitted to the Public Health Service was reviewed and approved by this Institution's Animal Care and Use Committee on (insert date of approval) :

Title of Application:
Name of Principal Investigator:
Name of Institution:

This institution has an Animal Welfare Assurance on file with the Office for Protection from Research Risks. The Assurance number is _____.

(Insert old Assurance number until a new Assurance number is assigned.)

As a condition of approval, this Institution's Animal Care and Use Committee (IACUC) required the following modifications to the above-referenced referenced application:**

(Signature)
(Title)

* This address should be used for submission with grant applications. If verification is submitted subsequent to the submission of the application, it should be addressed to the Executive Secretary of the initial review group designated on the card returned to the institution acknowledging receipt of the application. For noncompeting grant applications, verification should be addressed to the appropriate Program Administrator/Grants Management Officer. For contract proposals, verification should be addressed to the Contract Officer.

** This information is required when the modifications are not reflected in the grant application or contract proposal.

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Institutions That Do Not Have an Approved or
Provisionally-Acceptable Assurance

Institutions that do not have an approved or provisionally-acceptable Animal Welfare Assurance on file with OPRR must submit, with the application or proposal, a declaration that the institution will establish an Institutional Animal Care and Use Committee and submit an Assurance upon request by OPRR. The following letter is an example of an Acceptable Declaration Letter:

EXAMPLE OF AN ACCEPTABLE DECLARATION LETTER

Date

Division of Research Grants*
National Institutes of Health
5333 Westbard Avenue
Westwood Building, Room 240
Bethesda, MD 20205

Dear Sir:

This institution does not have an Animal Welfare Assurance on file with the Office for Protection from Research Risks (OPRR) to cover the following application:

Title of Application:

Name of Principal Investigator:

Name of Institution:

This institution will establish an Institutional Animal Care and Use Committee (IACUC), have the application reviewed by the IACUC and submit an Animal Welfare Assurance, upon request, to OPRR.

(Signed by Institutional Official)
(Title)

* For contract proposals, this letter should be addressed to the Contract Officer.

When appropriate, OPRR will request that the institution submit an Assurance. The Institutional Animal Care and Use Committee (IACUC) must review those sections of the application or proposal related to the care and use of animals and submit the Assurance and verification of IACUC approval to OPRR. The Example of an Acceptable Verification Letter (see preceding page of this document) may be followed in submitting verification of IACUC approval.

SAMPLE ANIMAL WELFARE ASSURANCEBackground Information

A sample Animal Welfare Assurance has been prepared by the Office for Protection from Research Risks to assist institutions in developing an Assurance in accordance with the Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals (see pps. 19-26 of this document). This sample Assurance includes all of the necessary elements for compliance with the PHS Policy. There are several areas in an Assurance which require that the institution provide specific information regarding procedures, policies, and the responsibilities and qualifications of the personnel of the institution. The Animal Welfare Assurance will need to be tailored to meet the administrative and research requirements for each institution. This sample Assurance document provides suggestions and examples of the kind of information that is to be provided by the institution in accordance with this PHS Policy. The sample refers to an Institutional Animal Care and Use Committee (IACUC), a generic name for the institutional committee established in accordance with the PHS Policy to fulfill the functions outlined in the Policy. In preparing its Assurance document each institution should consistently use whatever name it has assigned to that committee. More than one IACUC may be established to meet the needs of an institution. The Assurance must identify each IACUC established by the institution.

This sample is intended to aid your institution in developing an Animal Welfare Assurance. Please note that the text of the sample Assurance contains regular type as well as italics. The italic print indicates where you should provide information specific to your institution. Close adherence to the format will facilitate the review process. Questions should be directed to the Office for Protection from Research Risks, Policy and Assurance Staff, National Institutes of Health, Building 31, Room 4B09, Bethesda, Maryland, 20892, (301) 496-7041.

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INSTITUTIONAL LETTERHEAD

*(Name of Institution)*Assurance of Compliance with Public Health Service
(PHS) Policy on Humane Care and Use
of Laboratory Animals

(Name of Institution), hereinafter referred to as institution, hereby gives assurance that it will comply with the Public Health Service Policy on Humane Care and Use of Laboratory Animals, hereinafter referred to as PHS Policy.

I. Applicability

This Assurance is applicable to all research, research training, experimentation, and biological testing and related activities, herein-after referred to as activities, involving live, vertebrate animals supported by the Public Health Service (PHS) and conducted at this institution, or at another institution as a consequence of the sub-granting or subcontracting of a PHS-conducted or supported activity by this institution. "Institution" includes the following branches and major components of *(name of institution)* (*list every branch and major component covered by this Assurance*). (*If applicable*), "Institution" also includes the following branches and major components of *(name(s) of any other institution(s) to be included under this Assurance)* (*list every branch and major component of other institution(s) to be covered by this Assurance*).

II. Institutional Policy

- A. This institution will comply with all applicable provisions of the Animal Welfare Act and other Federal statutes and regulations relating to animals.
- B. This institution is guided by the "U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training."
- C. This institution acknowledges and accepts responsibility for the care and use of animals involved in activities covered by this Assurance. As partial fulfillment of this responsibility this institution will make a reasonable effort to ensure that all individuals involved in the care and use of laboratory animals understand their individual and collective responsibilities for compliance with this Assurance as well as all other applicable laws and regulations pertaining to animal care and use.

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D. This institution has established and will maintain a program for activities involving animals in accordance with the Guide for the Care and Use of Laboratory Animals (Guide).

III. Institutional Program for Animal Care and Use

A. The lines of authority and responsibility for administering the program and ensuring compliance with this Policy are:

(Describe or diagram the organization of the administration and staff, including the Institutional Animal Care and Use Committee, the Institutional Official, and the veterinarian.)

B. The qualifications, authority, and percent of time contributed by veterinarian(s) who will participate in the program are:

(Indicate professional or academic degrees and the number of years of pertinent training or experience in laboratory animal medicine. Describe the veterinarians' functions, percentage of time contribution and responsibilities insofar as they relate to implementation of this Policy and the recommendations in the Guide for the Care and Use of Laboratory Animals.)

C. This institution has established an Institutional Animal Care and Use Committee (IACUC), which is qualified through the experience and expertise of its members to oversee the institution's animal program, facilities, and procedures. The IACUC consists of at least five members, and its membership meets the compositional requirements set forth in the PHS Policy at IV.A.3.b. Attached is a list of the names, position titles, earned degrees and other credentials of the IACUC chairperson and members.

D. The IACUC will:

1. Review at least once every six months the institution's program for humane care and use of animals, using the Guide as a basis for evaluation.
2. Inspect at least once every six months all of the institution's animal facilities (including satellite facilities) using the Guide as a basis for evaluation.
3. Prepare reports of the IACUC evaluations as set forth in the PHS Policy at IV.B.3. and submit the reports to *(insert name or title of the Institutional Official signing the Assurance)*.
4. Review concerns involving the care and use of animals at the institution.
5. Make written recommendations to *(insert name or title of the Institutional Official signing the Assurance)* regarding any

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aspect of the institution's animal program, facilities, or personnel training.

6. Review and approve, require modifications in (to secure approval) or withhold approval of those activities related to the care and use of animals as set forth in the PHS Policy at IV.C.
7. Review and approve, require modifications in (to secure approval) or withhold approval of proposed significant changes regarding the use of animals in ongoing activities as set forth in the PHS Policy at IV.C.
8. Notify investigators and the institution in writing of its decision to approve or withhold approval of those activities related to the care and use of animals, or of modifications required to secure IACUC approval as set forth in the PHS Policy at IV.C.4.
9. Be authorized to suspend an activity involving animals as set forth in the PHS Policy at IV.C.6.

E. The procedures which the IACUC will follow to fulfill the requirements set forth in the PHS Policy at IV.B. are:

(Describe how the IACUC will fulfill each of the functions set forth in the PHS Policy at IV.B. Include how often the IACUC will meet, how often it will inspect facilities, and how the inspections will take place. Describe the procedures the IACUC will follow to address any concerns, and how recommendations will be developed and forwarded to the Institutional Official. The channels for receiving proposed activities, and for reporting the results of IACUC review of applications and proposals should be addressed.)

F. The individual(s) authorized by this institution to verify IACUC approval of those sections of applications and proposals related to the care and use of animals is (*insert name of individual*).

G. The health program for personnel who work in laboratory animal facilities or have frequent contact with animals is:

(Describe the institution's occupational health program, including the frequency of tuberculosis tests, if any, requirements for medical examinations, etc. The institution may submit a memorandum or pamphlet (if one exists) which informs animal care and use staff of institutional policies regarding health screening or tests.)

H. The total gross number of square feet in each animal facility (including each satellite facility), the species of animals housed therein and the average daily inventory, by species, of animals in each facility. (*This information may be provided in an attached chart.*)

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I. The training or instruction available to scientists, animal technicians, and other personnel involved in animal care, treatment, or use are:

(Provide a synopsis of the training or instruction available in the humane practice of animal care and use, as well as training or instruction in research and testing methods that minimize the number of animals required to obtain valid results and minimize animal distress.)

IV. Institutional Status

As specified in the PHS Policy at IV.A.2., as Category 1, all of this institution's programs and facilities (including satellite facilities) for activities involving animals have been evaluated and accredited by the American Association for Accreditation of Laboratory Animal Care. All of this institution's programs and facilities (including satellite facilities) for activities involving animals have also been evaluated by the IACUC and will be reevaluated by the IACUC at least once every six months.

- OR -

As specified in the PHS Policy at IV.A.2, as Category 2, all of this institution's programs and facilities (including satellite facilities) for activities involving animals have been evaluated by the IACUC and will be reevaluated by the IACUC at least once every six months. The report of the IACUC evaluation has been submitted to *(insert name or title of the Institutional Official signing the Assurance)* and a copy of the report is attached. The report contains a description of the nature and extent of this institution's adherence to the Guide. Any departures from the Guide are identified specifically and reasons for each departure are stated. Where program or facility deficiencies are noted, the report contains a reasonable and specific plan and schedule for correcting each deficiency. The report distinguishes significant deficiencies from minor deficiencies. Semiannual reports of the IACUC evaluation submitted to the Institutional Official *(insert name or title of the Institutional Official signing the Assurance)* will also contain a reasonable and specific plan and schedule for correcting each deficiency and distinguish significant deficiencies from minor deficiencies. Semiannual reports of IACUC evaluations will be maintained by this institution and made available to OPRR upon request.

V. Recordkeeping Requirements

A. This institution will maintain for at least three years:

1. A copy of this Assurance and any modifications thereto, as approved by PHS.
2. Minutes of IACUC meetings, including records of attendance, activities of the committee, and committee deliberations.

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3. Records of applications, proposals, and proposed significant changes in the care and use of animals and whether IACUC approval was given or withheld.
4. Records of semiannual IACUC reports and recommendations as forwarded to (*insert name or title of the Institutional Official signing the Assurance*).
5. Records of accrediting body determinations.

B. This institution will maintain records that relate directly to applications, proposals, and proposed changes in ongoing activities reviewed and approved by the IACUC for the duration of the activity and for an additional three years after completion of the activity.

C. All records shall be accessible for inspection and copying by authorized OPRR or other PHS representatives at reasonable times and in a reasonable manner.

VI. Reporting Requirements

A. At least once every 12 months, the IACUC, through the Institutional Official, will report in writing to the Office for Protection from Research Risks (OPRR):

1. Any change in the status of the institution (e.g., if the institution becomes accredited by AAALAC or AAALAC accreditation is revoked), any change in the description of the institution's program for animal care and use as described in this Assurance, or any changes in IACUC membership. If there are no changes to report, this institution will submit a letter to OPRR stating that there are no changes.
2. Notification of the date that the IACUC conducted its semiannual evaluations of the institution's program and facilities (including satellite facilities) and submitted the evaluations to (*insert name or title of the Institutional Official signing the Assurance*).

B. The IACUC, through the Institutional Official, will provide the OPRR promptly with a full explanation of the circumstances and actions taken with respect to:

1. Any serious or continuing noncompliance with the PHS Policy.
2. Any serious deviations from the provisions of the Guide.
3. Any suspension of an activity by the IACUC.

C. Reports filed under VI.A.2. and VI.B. above shall include any minority views filed by members of the IACUC.

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VII. Institutional Endorsement and PHS Approval**A. Authorized Institutional Official**

Name: _____
Title: _____
Address: _____

Phone: _____
Signature: _____ Date: _____

B. PHS Approving Official

Name: _____
Title: _____
Address: _____

Phone: _____
Signature: _____ Date: _____

C. Effective Date of Assurance _____**D. Expiration Date of Assurance** _____

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* Indicates Chairperson
** Indicates Non-Scientific Member
NV Indicates Non-Voting Member

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* Institutions may identify animal areas in any manner they choose, e.g., by using initials or an I.D. number. However, the exact title and location of an area must be available to OPR upon request.)

U.S. GOVERNMENT PRINCIPLES FOR THE
UTILIZATION AND CARE OF VERTEBRATE ANIMALS USED
IN TESTING, RESEARCH, AND TRAINING

The development of knowledge necessary for the improvement of the health and well-being of humans as well as other animals requires in vivo experimentation with a wide variety of animal species. Whenever U.S. Government agencies develop requirements for testing, research, or training procedures involving the use of vertebrate animals, the following principles shall be considered; and whenever these agencies actually perform or sponsor such procedures, the responsible Institutional Official shall ensure that these principles are adhered to:

- I. The transportation, care, and use of animals should be in accordance with the Animal Welfare Act (7 U.S.C. 2131 et seq.) and other applicable Federal laws, guidelines, and policies.^{1/}
- II. Procedures involving animals should be designed and performed with due consideration of their relevance to human or animal health, the advancement of knowledge, or the good of society.
- III. The animals selected for a procedure should be of an appropriate species and quality and the minimum number required to obtain valid results. Methods such as mathematical models, computer simulation, and in vitro biological systems should be considered.
- IV. Proper use of animals, including the avoidance or minimization of discomfort, distress, and pain when consistent with sound scientific practices, is imperative. Unless the contrary is established, investigators should consider that procedures that cause pain or distress in human beings may cause pain or distress in other animals.
- V. Procedures with animals that may cause more than momentary or slight pain or distress should be performed with appropriate sedation, analgesia, or anesthesia. Surgical or other painful procedures should not be performed on unanesthetized animals paralyzed by chemical agents.
- VI. Animals that would otherwise suffer severe or chronic pain or distress that cannot be relieved should be painlessly killed at the end of the procedure or, if appropriate, during the procedure.

^{1/} For guidance throughout these Principles, the reader is referred to the Guide for the Care and Use of Laboratory Animals prepared by the Institute of Laboratory Animal Resources, National Academy of Sciences.

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- VII. The living conditions of animals should be appropriate for their species and contribute to their health and comfort. Normally, the housing, feeding, and care of all animals used for biomedical purposes must be directed by a veterinarian or other scientist trained and experienced in the proper care, handling, and use of the species being maintained or studied. In any case, veterinary care shall be provided as indicated.
- VIII. Investigators and other personnel shall be appropriately qualified and experienced for conducting procedures on living animals. Adequate arrangements shall be made for their in-service training, including the proper and humane care and use of laboratory animals.
- IX. Where exceptions are required in relation to the provisions of these Principles, the decisions should not rest with the investigators directly concerned but should be made, with due regard to Principle II, by an appropriate review group such as an institutional animal care and use committee. Such exceptions should not be made solely for the purposes of teaching or demonstration.

Reports filed under subparagraph (C) shall include any minority views filed by members of the committee.

"(c) The Director of NIH shall require each applicant for a grant, contract, or cooperative agreement involving research on animals which is administered by the National Institutes of Health or any national research institute to include in its application or contract proposal, submitted after the expiration of the twelve-month period beginning on the date of enactment this section—

"(1) assurances satisfactory to the Director of NIH that—

"(A) the applicant meets the requirements of the guidelines established under paragraphs (1) and (2) of subsection (a) and has an animal care committee which meets the requirements of subsection (b); and

"(B) scientists, animal technicians, and other personnel involved with animal care, treatment, and use by the applicant have available to them instruction or training in the humane practice of animal maintenance and experimentation, and the concept, availability, and use of research or testing methods that limit the use of animals or limit animal distress; and

"(2) a statement of the reasons for the use of animals in the research to be conducted with funds provided under such grant or contract.

Notwithstanding subsection (a)(2) of section 553 of title 5, United States Code, regulations under this subsection shall be promulgated in accordance with the notice and comment requirements of such section.

"(d) If the Director of NIH determines that—

"(1) the conditions of animal care, treatment, or use in an entity which is receiving a grant, contract, or cooperative agreement involving research on animals under this title do not meet applicable guidelines established under subsection (a);

"(2) the entity has been notified by the Director of NIH of such determination and has been given a reasonable opportunity to take corrective action; and

"(3) no action has been taken by the entity to correct such conditions; the Director of NIH shall suspend or revoke such grant or contract under such conditions as the Director determines appropriate.

"(e) No guideline or regulation promulgated under subsection (a) or (c) may require a research entity to disclose publicly trade secrets or commercial or financial information which is privileged or confidential."

Office for Protection from Research Risks (OPRR)
National Institutes of Health
9000 Rockville Pike
Building 31, Room 4B09
Bethesda, Maryland 20892
301-496-7005



Public Health Service
National Institutes of Health

Guide for the Care and Use of Laboratory Animals

NIH Publication No. 86-23
Revised 1985

NOTICE: This project was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine.

The Research Council was established by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. The Research Council operates in accordance with general policies determined by the Academy under the authority of its congressional charter of 1863, which establishes the Academy as a private, nonprofit, self-governing membership corporation. The Research Council has become the principal operating agency of both the National Academy of Sciences and National Academy of Engineering in the conduct of their services to the government, the public, and the scientific and engineering communities. It is administered jointly by both Academies and the Institute of Medicine. The National Academy of Engineering and the Institute of Medicine were established in 1964 and 1970, respectively, under the charter of the National Academy of Sciences.

This edition of the *Guide* was prepared by ILAR for the National Institutes of Health under contract NO1-RR-2-2135, administered by the Animal Resources Program, Division of Research Resources.

COMMITTEE ON CARE AND USE OF LABORATORY ANIMALS

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The Institute of Laboratory Animal Resources (ILAR) was founded in 1952 under the auspices of the National Research Council. A component of the Commission on Life Sciences, ILAR serves as a coordinating agency and a national and international resource for compiling and disseminating information on laboratory animals, promoting education, planning and conducting conferences and symposia, surveying existing and required facilities and resources, upgrading laboratory animal resources, and promoting high-quality, humane care of laboratory animals in the United States.

Preface

The *Guide for the Care and Use of Laboratory Animals* was first published in 1963 under the title *Guide for Laboratory Animal Facilities and Care* and was revised in 1965, 1968, 1972, and 1978. It was given its current title in 1972 to reflect the enlarged scope of its recommendations. More than 300,000 copies have been distributed since it was first published, and it is widely accepted by scientific institutions as a primary reference on animal care and use. The changes and the new material in this edition are in keeping with the belief that the *Guide* must be a living document, subject to modification with changing conditions and new information.

Before revision of this edition, members of the scientific community and public were invited to comment on the *Guide* at three open meetings held in Washington, D.C., on May 17, 1983; in San Francisco, California, on July 11, 1983; and in Chicago, Illinois, on July 12, 1983. Comments received at these meetings, as well as all other written comments received, were reviewed and considered by the committee.

The purpose of the *Guide* is to assist institutions in caring for and using laboratory animals in ways judged to be professionally and humanely appropriate. The recommendations are based on published data, scientific principles, expert opinion, and experience with methods and practices that have proven to be consistent with high quality humane animal care and use.

The *Guide* provides information on common laboratory animals housed under a variety of circumstances. It is not an exhaustive review of all aspects of animal care and use; many different species of animals are studied in biomedical research that might not be covered in the *Guide*. Supplemental information on breeding, care, and management of selected laboratory animals is available in other publications prepared by the Institute of Laboratory Animal Resources (ILAR).

Readers who detect errors of omission or commission are invited to send corrections and suggestions to the Institute of Laboratory Animal Resources, National Research Council, 2101 Constitution Avenue, NW, Washington, DC 20418.

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The ability of biomedical scientists to enhance the well-being of humans and animals depends directly on advancements made possible by research, much of which requires the use of experimental animals. The scientific community has long recognized both a scientific and an ethical responsibility for the humane care of animals, and all who care for or use animals in research, testing, and education must assume responsibility for their general welfare.¹ It is especially important to recognize that the intent of research is to provide data that will advance knowledge of immediate or potential benefit to humans and animals. Scientists have developed, and should continue to develop and use, scientifically valid adjunctive or alternative methods to animal experimentation. The guidelines stated herein acknowledge these responsibilities.

Institutional animal facilities and programs should be operated in accordance with the requirements and recommendations of this *Guide*, the Animal Welfare Act (P.L. 89-544, as amended by P.L. 91-579 and P.L. 94-279), and other applicable federal (Appendices C and D), state, and local laws, regulations, and policies. Nothing in the *Guide* is intended to limit an investigator's freedom—indeed, obligation—to plan and conduct animal experiments in accord with scientific and

¹The Public Health Service requires that the use of animals be justified in terms stated by the *Public Health Service Policy on Humane Care and Use of Animals by Awarding Institutions*.

humane principles. It is envisioned that the *Guide* will encourage scientists to seek improved methods of laboratory animal care and use. Finally, it should be understood by all who use the *Guide* that it is deliberately written in general terms so that the recommendations can be applied in the diverse institutions that produce or use animals for research, testing, and education. *Professional judgment is essential in the application of these guidelines.*

For the purposes of this *Guide*, laboratory animals include any warm-blooded vertebrate animal used in research, testing, and education. Although marine mammals and cold-blooded animals are not discussed specifically, the humane principles stated are applicable to their care and use. The *Guide* deals with farm animals in the context of their use in biomedical research—*not* with their use in research on production agriculture.

I Institutional Policies

Proper care and humane treatment of animals used in research, testing, and education (referred to in this *Guide* as animal care and use) require scientific and professional judgment, which is based on knowledge of the husbandry needs of each species and the special requirements of research, testing, and educational programs. The guidelines in this section are intended to aid in developing institutional policies governing the care and use of laboratory animals.

Each institution should establish an animal care and use program that is managed in accordance with this *Guide* and in compliance with applicable federal, state, and local laws and regulations. An institutional animal care and use committee should be established to monitor the program. Responsibility for directing the program can be given either to a veterinarian with training or experience in laboratory animal science and medicine or to another qualified professional; however, at least one veterinarian should always be associated with the program.

MONITORING THE CARE AND USE OF ANIMALS

The appropriate administrative official at each institution should appoint the animal care and use committee (hereinafter called the committee). The committee should include a scientist from the institution with experience in research involving animals; a doctor of veterinary medicine who is certified [see American College of Laboratory Animal Medicine (ACLAM), Appendix B] or has training or expe-

rience in laboratory animal science and medicine; a person who is not otherwise affiliated with the institution; and other members as required by institutional needs and by federal, state, and local regulations and policies.

The committee should be responsible for evaluating the animal care and use program. Its duties should include:

- meeting at regular intervals appropriate to the institution's program, but no less than annually, to ensure compliance with the *Guide*;
- ensuring that a mechanism exists at the institution to review the humane and appropriate care and use of laboratory animals in research, testing, and education;
- providing a written report, at least annually, to the responsible administrative official on the status of the laboratory animal care and use program; and
- performing other functions as required by institutional needs and by federal, state, and local regulations and policies.

VETERINARY CARE

Adequate veterinary care must be provided. Institutional requirements will determine the need for full-time, part-time, or consultative veterinary services. When outside services are used, there should be frequent, regular participation and visitation by the consulting veterinarian. For specific responsibilities of the veterinarian refer to Chapter 3 of this *Guide*.

PERSONNEL QUALIFICATIONS

The number and qualifications of personnel required to conduct and support an animal care and use program depend on several factors. Among these are the type and size of the institution; administrative structure for ensuring adequate animal care; physical plant; number and species of animals maintained; and nature of research, testing, and educational activities. It is the responsibility of the institution to ensure that people caring for or using laboratory animals are qualified to do so.

Animal Resource Professional Personnel

Employment of a full-time staff specifically concerned with the program is highly recommended. The program can include a broad range of services provided by personnel with expertise in animal husbandry,

administration, clinical medicine, diagnostic laboratory procedures, and various aspects of research support. It is recommended that professional staff participate in continuing education activities relevant to their program responsibilities.

In some instances, depending on the size of the program and types of services provided, it might be appropriate for the program to be directed by a qualified professional other than a veterinarian. Adequate veterinary care can be provided through part-time or consultative service by a veterinarian with training or experience in laboratory animal science and medicine if the program does not require a full-time veterinarian.

Animal Care and Technical Personnel

Animal care programs require technical and husbandry support. Institutions should employ people trained in laboratory animal science or provide for both formal and on-the-job training to ensure effective implementation of the program. Several institutions of higher learning offer programs in animal technology [see American Veterinary Medical Association (AVMA), Appendix B]. Certification programs are also available [see American Association for Laboratory Animal Science (AALAS), Appendix B], and it is desirable that permanent, full-time animal care personnel be certified. Many states require that veterinary or animal health technicians be registered or licensed (see AVMA, Appendix B). Animal care personnel should also participate regularly in continuing education activities with relevance to their responsibilities.

Research Staff

It is an institutional obligation to ensure that professional and technical personnel and students who perform animal anesthesia, surgery, or other experimental manipulations are qualified through training or experience to accomplish these tasks in a humane and scientifically acceptable manner. Special training programs should be provided for technicians and faculty, as well as undergraduate, graduate, and postdoctoral students.

Special Qualifications for Personnel Using Hazardous Agents

Professional staff conducting and supporting research programs involving hazardous biological, chemical, or physical agents should be

qualified to assess dangers associated with these programs and capable of selecting safeguards appropriate to the dangers of using hazardous agents. Animal care staff should understand the hazards involved and should be proficient in implementing the required safeguards.

PERSONAL HYGIENE

It is essential that the animal care staff maintain a high standard of personal cleanliness. Facilities and supplies for meeting this obligation should be provided. Clothing suitable for use in the animal facility should be supplied and laundered by the institution. A commercial laundering service is acceptable in many situations; however, institutional facilities should be used to decontaminate clothing exposed to potentially hazardous microbial agents or toxic substances. In some circumstances it is acceptable to use disposable gear such as gloves, masks, head covers, coats, coveralls, and shoe covers. Washing and showering facilities appropriate to the program should be made available.

Personnel should change clothing as often as is necessary to maintain personal hygiene. Outer garments worn in animal rooms should not be worn outside the animal facility.

Personnel should not be permitted to eat, drink, smoke, or apply cosmetics in animal rooms. A separate area or room should be made available for these purposes.

OCCUPATIONAL HEALTH

An occupational health program is mandatory for personnel who work in laboratory animal facilities or have substantial animal contact. This program should include a physical examination and a medical and work history prior to work assignment. Periodic physical examinations are advisable for people in some job categories. In addition, an educational program should be established to teach personnel about zoonoses, personal hygiene, and other considerations, such as precautions to be taken by pregnant women. Occupational hazards, including animal bites and allergies (Enviro Control, Inc., 1979), should be recognized, and methods for preventing and treating them should be developed.

An immunization schedule should be adopted. It is important to immunize animal care personnel against tetanus. In addition, an opportunity for protection by preexposure immunization should be afforded to people who handle animals at substantial risk of infection

with such agents as rabies virus and hepatitis B virus. Prophylactic vaccinations should be considered when research is being conducted on infectious diseases for which effective vaccines are available.

Zoonoses surveillance should be a part of an occupational health program and should include keeping records of individual work assignments, bite wounds, and unusual illnesses (CDC, 1984; Fox et al., 1984). Personnel should be instructed to notify their supervisors of illnesses and of suspected health hazards. Furthermore, consideration should be given to obtaining and storing individual pre- and postemployment serum samples for future diagnostic purposes.

Nonhuman primate diseases that are transmissible to humans can be a serious hazard. Personnel (including animal technicians, clinicians, investigators, students, research technicians, maintenance workers, and security personnel) who have contact with nonhuman primates should undergo regularly scheduled tests for tuberculosis. Protective clothing, such as outer garments, gloves, masks, and face shields, should be used when handling these animals.

There should be methods for monitoring exposure to potentially hazardous biological, chemical, and physical agents (CFR, 1984a,b). Protective devices should be provided, and other safety measures consistent with current practices should be adopted.

ANIMAL EXPERIMENTATION INVOLVING HAZARDOUS AGENTS

Institutions should have policies governing experimentation with hazardous agents. A biosafety committee whose members are knowledgeable about hazardous agents should be appointed to evaluate safety issues. Since the use of animals in such studies requires special considerations, the procedures and the facilities to be used must be reviewed by both the biosafety and animal care and use committees. Formal safety programs should be established to assess the hazards, determine the safeguards needed for their control, and ensure that the staff is competent (as discussed above in the section on "Special Qualifications for Personnel Using Hazardous Agents") and the facilities are adequate for the safe conduct of the research. Technical support should be provided to monitor compliance with institutional biosafety policies.

The use of certain hazardous agents necessitates compliance with federal, state, and local regulations and with guidelines issued by granting institutions. Applicable publications containing these regulations and guidelines include:

- Code of Federal Regulations. 1984. Title 10; Part 20, Standards for Protection Against Radiation. Washington, D.C.: Office of the Federal Register.
- Code of Federal Regulations. 1984. Title 29; Part 1910, Occupational Safety and Health Standards; Subpart G, Occupational Health and Environmental Control, and Subpart Z, Toxic and Hazardous Substances. Washington, D.C.: Office of the Federal Register.
- Code of Federal Regulations. 1984. Title 40; Part 260, Hazardous Waste Management System: General; Part 261, Identification and Listing of Hazardous Waste; Part 262, Standards Applicable to Generators of Hazardous Waste; Part 263, Standards Applicable to Transporters of Hazardous Waste; Part 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Part 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; and Part 270, EPA Administered Permit Programs: The Hazardous Waste Permit Program. Washington, D.C.: Office of the Federal Register.
- Centers for Disease Control and National Institutes of Health. 1984. Biosafety in Microbiological and Biomedical Laboratories. DHEW Pub. No. (CDC) 84-8395. Washington, D.C.: U.S. Department of Health and Human Services. 100 pp.
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SPECIAL CONSIDERATIONS**Physical Restraint**

Brief physical restraint of animals for examination, collection of samples, and a variety of other clinical and experimental manipulations can be accomplished manually or with devices such as restraint stocks or squeeze cages. It is important that such devices be suitable in size and design for the animal being held and operated properly to minimize stress and avoid injury to the animal.

Prolonged restraint of any animal, including the chairing of non-human primates, should be avoided unless essential to research objectives. Less restrictive systems, such as the tether system or the pole and collar system, should be used when compatible with research objectives (Wakeley et al., 1974; Byrd, 1979; Bryant, 1980; Anderson and Houghton, 1983; McNamee et al., 1984). The following are important guidelines for the use of restraint equipment:

- Animals to be placed in restraint equipment should be conditioned to such equipment prior to initiation of the research.
- The period of restraint should be the minimum required to accomplish the research objectives. Prolonged restraint for any reason must be approved by the committee.
- Restraint chairs or similar devices are not to be considered "normal" methods of housing, although they may be required for specific research objectives.
- Restraint chairs or similar devices must not be used simply as a convenience to investigators in handling or managing animals. When such devices are used, their use must be specifically approved by the committee.
- Attention must be paid to the possible development of lesions or illnesses associated with restraint, including contusions, decubital ulcers, dependent edema, and weight loss. If these or other problems occur, veterinary care must be provided to treat the animal, which if necessary must be temporarily or permanently removed from the restraint device.

Multiple Major Surgical Procedures

Multiple major survival surgical procedures on a single animal are discouraged. However, under special circumstances they might be permitted with the approval of the committee. One situation in which multiple survival surgical procedures might be justified is when they

are related components of a research project. Cost savings alone is not an adequate reason for performing multiple survival surgical procedures.

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Proper management of animal facilities is essential to the welfare of animals, validity of research data, and health and safety of the animal care staff. A good husbandry program provides a system of housing and care that permits animals to grow, mature, reproduce, and maintain good health. Good husbandry minimizes variations that can modify an animal's response to experimentation. Specific operating practices depend on many subjective and objective factors unique to individual institutions. Well-trained and motivated personnel can often ensure high quality animal care, even in institutions with less than optimal physical plants or equipment.

HOUSING

Caging or Housing System

The caging or housing system is one of the most important elements in the physical and social environment of research animals. It should be designed carefully to facilitate animal well-being, meet research requirements, and minimize experimental variables. The housing system should:

- provide space that is adequate, permits freedom of movement and normal postural adjustments, and has a resting place appropriate to the species;
- provide a comfortable environment;

- provide an escape-proof enclosure that confines animals safely;
- provide easy access to food and water;
- provide adequate ventilation;
- meet the biological needs of the animals, e.g., maintenance of body temperature, urination, defecation, and, if appropriate, reproduction;
- keep the animals dry and clean, consistent with species requirements;
- avoid unnecessary physical restraint; and
- protect the animals from known hazards.

Caging systems should facilitate research while maintaining good health of the animals. They should be constructed of sturdy, durable materials and designed to minimize cross-infection between adjoining units. To simplify servicing and sanitation, cages should have smooth, impervious surfaces that neither attract nor retain dirt and a minimum number of ledges, angles, and corners in which dirt or water can accumulate. The design should allow inspection of cage occupants without disturbing them. Feeding and watering devices should be easily accessible for filling, changing, cleaning, and servicing. Cages, runs, and pens must be kept in good repair to prevent injury to animals, promote physical comfort, and facilitate sanitation and servicing. Particular attention must be given to eliminating sharp edges and broken wires, keeping cage floors in good condition, and refurbishing or replacing rusted or other deteriorating equipment.

Social Environment

The social environment includes all interactions among individuals of a group or among those able to communicate. The effects of social environment on caged animals vary with the species and experience of the animals. They are often more difficult to define than the effects of physical environment. There is little objective evidence for defining adequate care in relation to social environment (Davis, 1978). The data are limited and contradictory (Brain and Benton, 1979) and lack sufficient substance to establish absolute recommendations; however, some guidance can be given based on current knowledge, experience, and professional judgment.

In selecting a suitable social environment, attention should be given to whether the animals are naturally territorial or communal and whether they will be housed singly or in groups. When appropriate, group housing should be considered for communal animals. In grouping animals, it is important to take into account population density

and ability to disperse; initial familiarity among animals; and age, sex, and social rank. Population density can affect reproduction, metabolism, immune responses, and behavior (Lindsey et al., 1978). Group composition should be held as stable as possible, particularly for canines, nonhuman primates, and other highly social mammals, because mixing groups or introducing new members can alter behavioral and physiological functions (Bernstein, 1964; Bernstein et al., 1977a,b). Consideration should also be given to enriching the environment as appropriate to the species, especially when animals will be held for long periods.

Space Recommendations for Laboratory Animals

There are few critical and objective data on space requirements for animals (Davis, 1978). Even if all the complex factors affecting caged animals were known and could be evaluated, it is unlikely that a single ideal or perfect system could be developed. Therefore, caging systems based on successful experience and professional judgment must be utilized. Minimum space recommendations for laboratory animals are given in Table 2-1. They are based on the best available information concerning reasonable space allocations for housing laboratory animals.

Special housing provisions are sometimes necessary for unusual laboratory species such as those with unique metabolic or genetic characteristics or special behavioral or reproductive requirements. Exercise areas, runs, or pens should be considered for animals that will be held for long periods.

TABLE 2-1. Minimum Space Recommendations for Laboratory Animals

Animals	Weight g	Type of Housing	Floor Area/Animal		Height: cm
			in ²	cm ²	
Mice	<10	Cage	6.0	38.71	5
	10-15	Cage	8.0	51.62	5
	15-25	Cage	12.0	77.42	5
>25	Cage	15.0	96.78	5	12.70
	Cage				12.70
Rats	<100	Cage	17.0	109.68	7
	100-200	Cage	23.0	148.40	7
	200-300	Cage	29.0	187.11	7
	300-400	Cage	40.0	258.08	7
	400-500	Cage	60.0	387.12	7
>500	Cage	70.0	451.64	7	17.78
	Cage				17.78

TABLE 2-1. (continued)

Animals	Weight	Type of Housing	Floor Area/Animal	Height*	Type of Housing			Floor Area/Animal	Height*
					in ²	cm ²	in	cm	in
Hamsters ^b	<60	Cage	10.0	64.52	6	15.24			
	60-80	Cage	13.0	93.88	6	15.24			
	80-100	Cage	16.0	103.23	6	15.24			
Guinea pigs ^b	>100	Cage	19.0	122.59	6	15.24			
	≤350	Cage	60.0	387.12	7	17.78			
	>350	Cage	101.0	651.65	7	17.78			
Rabbit ^b	<2	Cage	1.5	0.14	14	35.56			
	2-4	Cage	3.0	0.28	14	35.56			
	4-5.4	Cage	4.0	0.37	14	35.56			
	>5.4	Cage	5.0	0.46	14	35.56			
Cats	≤4	Cage	3.0	0.28	24	60.96			
	>4	Cage	4.0	0.37	24	60.96			
Dogs ^c	<15	Pen/run	8.0	0.74	—				
	15-30	Pen/run	12.1	1.12	—				
	>30	Pen/run	24.0	2.23	—				
Nonhuman primates ^d	<15	Cage	8.0	0.74	32	81.28			
	15-30	Cage	12.1	1.12	36	91.44			
	>30	Cage	c	c	c	c			
Pigeons	<1	Cage	1.6	0.15	20	50.80			
	1-3	Cage	3.0	0.28	30	76.20			
	3-10	Cage	4.3	0.40	30	76.20			
	10-15	Cage	6.0	0.56	32	81.28			
	15-25	Cage	8.0	0.74	36	91.44			
	>25	Cage	25.1	2.33	84	213.36			
Quail	—	Cage	0.8	0.074	e				
	—	Cage	0.25	0.023	e				
	—	Cage	0.5	0.046	e				
Chickens	<0.25	Cage	0.25	0.023	e				
	0.25-0.5	Cage	0.50	0.046	e				
	0.5-1.5	Cage	1.00	0.093	e				
	1.5-3	Cage	2.00	0.186	e				
>3	Cage	3.06	0.285	e					

TABLE 2-1. (continued)

Animals	Weight, kg	Type of Housing	Floor Area/Animal ft ²	Height* m ²	Height* in cm
	75-200	Pen	40.0	3.72	—
	200-350	Pen	60.0	5.57	—
	350-500	Pen	80.0	7.43	—
	500-650	Pen	105.0	9.75	—
	>650	Pen	120.0	11.15	—
Horses					
	<75	Pen	18.0	1.67	—
	75-200	Pen	36.0	3.34	—
	200-350	Pen	54.0	5.02	—
	350-500	Pen	72.0	6.69	—
	500-650	Pen	93.0	8.64	—
	>650	Pen	108.0	10.03	—
Ponies					
	—	Tie Stall	44.0	4.09	—
	—	Pen	144.0	13.38	—
Dogs					
1-4/Pen	—	Pen	72.0	6.69	—
>4/Pen	≤200	Pen	60.0	5.57	—
	>200	Pen	72.0	6.69	—

*From the resting floor to the cage top.

Space recommendations are comparable to the current regulations of the Animal Welfare Act. Mothers with litters require more space (CFR, 1981a).

These recommendations may require modification according to the body conformation of individual animals and breeds. Some dogs, especially those toward the upper limit of each weight range, may require additional floor space or cage height to ensure compliance with the regulations of the Animal Welfare Act. These regulations (CFR, 1984a) mandate that the height of each cage be sufficient to allow the occupant to stand in a "comfortable position" and that the minimum square footage of floor space be equal to the "mathematical square of the sum of the length of the dog in inches, as measured from the tip of its nose to the base of its tail, plus 6 inches, expressed in square feet." If dogs are housed in group pens or runs, only compatible animals should be housed together.

The designated groups are based on approximate sizes of various nonhuman primate species used in biomedical research. Examples of species included in each group are:

- Group 1—marmosets, tamarins, and infants of various species
- Group 2—capuchins, squirrel monkeys, and similar species
- Group 3—macaques and African species
- Group 4—male macaques and large African species
- Group 5—baboons and nonbrachiating species larger than 15 kg
- Group 6—great apes and brachiating species

Institutions are encouraged to provide alternatives to individual caging. Infants and

juveniles can be housed in group cages, for example. If adults are to be housed in groups, it is essential that only compatible animals be kept together. Newly grouped animals must be closely monitored to detect injuries due to fighting. Space in group cages should be enriched with structures such as resting perches and shelves. The minimum height of pens and runs used to house nonhuman primates should be 6 ft (1.8 m). For chimpanzees and brachiating species (orangutans, gibbons, spider monkeys, and woolly monkeys), the minimum cage height should be such that the animals can, when fully extended, swing from the cage ceiling without having their feet touch the floor.

*Sufficient headroom must be provided for birds to stand erect.

Space recommendation is not applicable to sows housed in gestation or farrowing stalls.

Activity

Animals maintained in a laboratory environment might have a somewhat restricted activity relative to that in the "natural" state. Unfortunately there are no unequivocal data relating the quality or quantity of an animal's activity to its physical or psychological well-being. For example, housing an animal in a cage does not necessarily limit the amount of activity in which the animal engages, although the form of activity might be changed. Therefore, the need for exercise, defined here as supplementary or induced activity, is subject to professional judgment based on an understanding of species or breed temperament, age, history, physical condition, nature of the research, and expected duration of laboratory residence. Examples of supplementary activity that can be provided include using a treadmill or exercise wheel, walking on a leash, providing access to a run, or releasing an animal from its cage into an animal room. For large farm animals, such as sheep, horses and cattle, loafing areas, exercise lots, and pastures are suitable. Provision should be made for animals with specialized locomotor patterns to express these patterns, especially when the animals are held for long periods. For example, ropes, bars, and perches are appropriate for brachiating nonhuman primates. Cages are often used for short-term (up to 3 months) housing of dogs and may be necessary for postsurgical care, isolation of sick dogs, and metabolic studies. However, pens, runs, or other out-of-cage space provide more opportunity for exercise, and their use is encouraged when holding dogs for long periods.

ANIMAL ENVIRONMENT

The environment in which animals are held should be appropriate

to the species and its life history. Commonly used laboratory animals such as rats and mice are highly versatile and readily adapt to laboratory caging systems. Some less commonly used animals may have specific needs of which both the investigator and animal care staff should be aware (e.g., reproductive behavior in some species of voles can be disrupted by changing cages too frequently). In the following sections some considerations for common laboratory animals are discussed.

Micro- and Macroenvironments

The microenvironment of an animal is defined as the physical environment immediately surrounding it, for example, temperature and humidity in the cage or primary enclosure. The physical conditions in the room or secondary enclosure constitute the macroenvironment. It has been known for many years that there are differences between these two environments (Henriques and Hansen, 1904; Reyniers, 1942; Woods, 1978). Temperature, humidity, and concentrations of gases such as carbon dioxide and ammonia are higher in cages (unless they are individually ventilated) than in the surrounding room (Murakami, 1971; Serrano, 1971). The extent of micro- and macroenvironmental differences is influenced by cage design (Serrano, 1971; Besch, 1975; Keller et al., 1983). A few investigators have explored the relationship of microenvironmental conditions to physiological responses and health status of animals. Some have shown that experimental exposure of rodents to elevated temperature, humidity, and concentrations of ammonia can increase their susceptibility to infectious, toxic, and other harmful agents (Baeijer, 1968; Broderson et al., 1976). Therefore, it should be recognized that microenvironmental conditions can affect research results.

Temperature and Humidity

Temperature and humidity are probably the two most important factors in an animal's physical environment because they can affect metabolism and behavior. The range of environmental temperatures at which an animal's oxygen consumption is minimal and virtually independent of changes in ambient temperature is called the thermoneutral zone. Within this zone an animal does not need physical or chemical mechanisms to control heat production or loss (Weihs, 1976). At temperatures immediately above this zone, metabolic rate increases; however, the animal successfully avoids overheating by

evaporative heat loss. Experience has shown that for optimal development, comfort, reactivity, and adaptability, recommended ranges for dry-bulb temperatures (Table 2-2) generally are lower than the reported thermoneutral zones (Besch, 1985). No adverse effects to common laboratory animals have been reported for these recommended microenvironmental temperature or humidity ranges, and all are within the facilities and operating standards established by the U.S. Department of Agriculture (CFR, 1984a).

TABLE 2-2. Recommended Relative Humidity and Dry-Bulb

Temperature for Common Laboratory Animals			
Animal	Relative Humidity (%)	Dry-Bulb Temperature ^a °C	Dry-Bulb Temperature ^a °F
Mouse	40-70	18-26	64.4-78.8
Rat	40-70	18-26	64.4-78.8
Hamster	40-70	18-26	64.4-78.8
Guinea pig	40-70	18-26	64.4-78.8
Rabbit	40-60	16-21	60.8-69.8
Cat	30-70	18-29	64.4-84.2
Dog	30-70	18-29	64.4-84.2 ^b
Nonhuman primate	30-70	18-29	64.4-84.2
Chicken	45-70	16-27	60.8-80.6 ^c

^aFrom ILAR, 1965, 1966, 1973a, 1977, 1978a,b, 1980.

^bTemperature of 27-29°C (80.6-84.2°F) recommended in post-operative recovery and whelping cages (ILAR, 1973a).

^cRecommendations for chickens 6 weeks of age or older. Higher temperatures are required for brooding chicks.
same other species (ILAR, 1973b).

Ventilation

The purpose of ventilation is to supply adequate oxygen; remove thermal loads caused by animal respiration, lights, and equipment; dilute gaseous and particulate contaminants; and control effects of

infiltration and exfiltration (Clough and Gamble, 1976; Edwards et al., 1983). The quality of an animal's microenvironment is determined by the effectiveness of the ventilation system in maintaining acceptable thermal conditions and controlling contaminants within the primary enclosure.

The long-accepted ventilation guideline of 10 to 15 room air changes per hour has been criticized in recent years as being energy intensive and based mainly on keeping odors below objectionable levels for humans. Furthermore, Besch (1980) has shown that ventilation based on room air changes, which does not take into account spatial dimensions of the room or number of animals present, is not necessarily as effective as ventilation rate per animal or animal cage. Woods and his colleagues (1975) suggested that ventilation rate per animal is not only effective but also provides an odor-free environment and is energy efficient. Nonetheless, years of experience have shown that 10 to 15 room air changes per hour appears to provide adequate ventilation for animal facilities. Other methods of providing equal or more effective ventilation are also acceptable.

Room air in animal facilities should not be recirculated unless it has been treated to remove particulate and toxic gaseous contaminants. Air treatment is often ineffective in animal facilities because of improper or insufficient maintenance of the system (Gordon, 1978). If recirculating systems or other energy-recovery devices are to be used, the system must be carefully maintained.

Consideration also should be given to control of relative air pressure in animal housing and service areas. For example, areas for quarantine, isolation, soiled equipment, use of biohazardous materials, and housing for nonhuman primates should be kept under relative negative pressure with appropriate air treatment of exhaust air, whereas clean equipment and pathogen-free animal housing areas should be kept under relative positive pressure.

Illumination

Lighting should be uniformly diffused throughout animal facilities and provide sufficient illumination to aid in maintaining good housekeeping practices, adequate inspection of animals, safe working conditions for personnel, and the well-being of the animals. Precise lighting requirements for maintenance of good health and physiological stability of animals are not known. In the past, illumination levels for animal rooms of 807 to 1076 lx (75 to 100 fcandles) have been recommended. Such levels have been shown to cause retinal damage

in albino mice (Greenman et al., 1982) and rats (Sotizer et al., 1970). Light levels of 323 lx (30 ft-candles) approximately 1.0 m (3.3 ft) above the floor appear to be sufficient for performance of routine animal care (Bellhorn, 1980). This would provide the equivalent of 32 to 40 lx (3.0 to 3.7 fcandles) to a rodent in the front of an upper cage in a cage rack. Sotizer et al. (1970) reported that these levels do not cause retinal lesions in albino rats held for up to 90 days. However, Weisse et al. (1974) found minimal retinal lesions in albino rats examined after 790 days of exposure to these levels. These observations should be considered when housing albino animals.

Provision of variable-intensity controls is an acceptable means of ensuring light intensities consistent with needs of animals and personnel working in animal rooms and energy conservation. A time-controlled lighting system should be used to provide a regular diurnal lighting cycle. Timer performance should be checked periodically to ensure proper cycling.

Noise

Noise from animals and the animal care activities is inherent in the operation of an animal facility (Pfaff and Stecker, 1976), and noise control should be considered in facility design. Separation of human from animal areas is the best way to minimize disturbances to personnel due to the sounds of animals and animal care routines. Within animal facilities, noisy activities such as cage washing and refuse disposal should be carried out in rooms or areas separate from those for animal housing. Excessive noise can be minimized by appropriate training of personnel and by the use of cushioned casters and bumpers on carts, trucks, and racks.

Noisy animals, such as dogs and nonhuman primates, should be housed away from rodents, rabbits, and cats. Continuous exposure to acoustical levels above 85 dB can have both auditory and nonauditory effects (Fletcher, 1976; Peterson, 1980), including cosinopenia and increased adrenal weights in rodents (Geber et al., 1966; Nayfield and Besch, 1981), reduced fertility in rodents (Zondek and Tamari, 1964) and increased blood pressure in nonhuman primates (Peterson et al., 1981). Noise from colonies of nonhuman primates, dogs, and swine usually is disturbing to other animals and to personnel working both inside and outside animal facilities. It can also pose important public relations problems. When personnel are exposed to noise levels exceeding federal standards, appropriate hearing protection programs should be established as outlined in the Code of Federal Regulations (C.F.R. 1984b).

FOOD

Animals should be fed palatable, uncontaminated, and nutritionally adequate food daily or according to their particular requirements (BARR, 1978; Pal et al., 1984), unless the experimental protocol requires otherwise. Feeders should allow easy access to food, while minimizing contamination by urine and feces. Food should be available in amounts sufficient to ensure normal growth in immature animals and maintenance of normal body weight, reproduction, and lactation in adults. The choice of laboratory animal diet will depend on animal requirements and experimental objectives.

Numerous factors are involved in supplying food containing adequate nutrients, including formulation and preparation; quality assurance; freedom from chemical and microbial contaminants; bioavailability of nutrients; palatability; and methods of milling, storing, and transporting. Animal colony managers should be judicious in purchasing, transporting, storing, and handling food to ensure that it does not introduce diseases, parasites, potential disease vectors (such as insects), or chemical contaminants into animal colonies. Purchasers are encouraged to consider manufacturers' and suppliers' procedures and practices for protecting nutrient quality.

In general, laboratory animal diets should not be manufactured or stored in facilities used for farm feeds or any products containing additives such as rodenticides, insecticides, hormones, antibiotics, fumigants, or other potential toxicants. Areas in which diets are processed or stored should be kept clean and enclosed to prevent entry of insects or other animals. Precaution should be taken if perishable items such as meats, fruits, and vegetables are fed, because these are potential sources of biological and chemical contamination and can lead to variation in the amount of nutrients consumed.

Contaminants in food can have dramatic effects on biochemical and physiological processes, even when the contaminants are present in concentrations too low to cause clinical signs of toxicity. For example, some contaminants induce the biosynthesis of hepatic enzymes, which can alter an animal's response to drugs (Newberne, 1975). Diets can contain mycotoxins such as aflatoxin B₁, a potent inducer of hepatic neoplasms; pesticide residues; heavy metals such as lead and cadmium; and other compounds such as diethylstilbestrol, an estrogenic substance. For some studies the valid interpretation of experimental data might require the use of a pretested laboratory animal diet, in which both biological and nonbiological food contaminants are identified and their concentrations documented.

The date of manufacture and other factors affecting shelf life of

food should be known by the user. Shelf life is not determined by time alone; handling and storage are also factors that must be considered. Stale food or food transported and stored inappropriately can become deficient in nutrients. It is necessary to pay careful attention to quantities received in each shipment and to rotate stock so that the oldest food is used first. Exposure to temperatures above 21°C (70°F), extremes in relative humidity, unsanitary conditions, light, oxygen, and insects hasten the deterioration of food. Experience has shown that most natural-ingredient, dry laboratory animal diets that contain preservatives and are stored properly can be used up to 6 months after manufacture. Vitamin C contained in food, however, generally has a shelf life of only 3 months. Therefore, if a vitamin C-containing diet stored more than 3 months is to be fed to animals requiring dietary vitamin C, it might be necessary to add an appropriate vitamin supplement. Refrigeration preserves nutritional quality and lengthens shelf life; nonetheless, food storage time should be reduced to the lowest practical minimum and the recommendations of the manufacturer considered. Purified and chemically defined diets are less stable than natural ingredient diets, and the shelf life is usually less than 6 months (Fullerton et al., 1982). These diets should be stored at 4°C (39°F) or colder.

Autoclavable diets require adjustments in nutrient concentrations, kinds of ingredients, and methods of preparation to withstand degeneration during sterilization (Westman, 1975). The date of sterilization should be recorded and the diet used expeditiously. Bulk supplies of food should be stored in designated, restricted areas that are cool, dry, clean, and free of vermin and other potential contaminants. Food should be stored off the floor on pallets, racks, or carts. Meats, fruits, vegetables, and other perishable items should be refrigerated. Unused, open bags of food should be stored in vermin-proof containers to minimize contamination and to avoid potential spread of disease agents. Food containers should not be transferred from room to room and should be cleaned and sanitized regularly.

BEDDING

Bedding should be absorbent, free of toxic chemicals or other substances that could injure animals or personnel, and of a type not readily eaten by animals. Bedding should be used in amounts sufficient to keep animals dry between cage changes without coming into contact with watering tubes. Aromatic hydrocarbons from cedar and

pine bedding materials can induce the biosynthesis of hepatic microsomal enzymes (Vesell, 1967; Vesell et al., 1976; Cunliffe-Beamer et al., 1981). Therefore, such beddings might be inappropriate for use in some experiments. Bedding should be stored off the floor on pallets, racks, or carts.

WATER

Ordinarily animals should have continuous access to fresh, potable, uncontaminated drinking water, according to their particular requirements. Periodic monitoring for pH, hardness, and microbial or chemical contamination might be necessary to ensure that water quality is acceptable. Water can be treated or purified to minimize or eliminate contamination. Experimental and testing protocols might require highly purified water.

Watering devices, such as drinking tubes and automatic waterers, should be examined routinely to ensure their proper operation. Sometimes it is necessary to train animals to use automatic watering devices. It is better to replace water bottles than to refill them; however, if bottles are refilled, care should be taken that each bottle is replaced on the cage from which it was removed.

SANITATION

Cleanliness

Sanitation is essential in an animal facility. Animal rooms, corridors, storage spaces, and other areas should be cleaned with appropriate detergents and disinfectants as often as is necessary to keep them free of dirt, debris, and harmful contamination. Cleaning utensils, such as mops, pails, and brooms, should not be transported between animal rooms.

Bedding used in cages or pens should be changed as often as is required to keep the animals dry and clean. For routine maintenance of small rodents such as rats, mice, and hamsters, one to three bedding changes per week will probably suffice. For larger animals, such as dogs, cats, and nonhuman primates, soiled litter material should be removed daily. Where animal waste is removed by hosing or flushing, this should be done at least once a day. Animals should be kept dry during such procedures. Litter should be emptied from cages and pans in an area other than in the animal rooms and in a manner that minimizes exposure of animals and personnel to aerosolized waste. In some instances frequent cage changing is counterproductive, such

as when pheromones are essential for reproduction or to achieve certain research objectives. Such instances necessitate reasonable exceptions to the regular cage-cleaning schedule.

Cages should be sanitized before animals are placed in them. Animal cages, racks, and accessory equipment, such as feeders and watering devices, should be washed and sanitized frequently to keep them clean and free from contamination. Ordinarily this can be achieved by washing solid-bottom rodent cages and accessories once or twice a week and cage racks at least monthly. Wire-bottom rodent cages and cages for all other animals should be washed at least every 2 weeks. It is good practice to have extra cages available at all times so that a systematic cage washing schedule can be maintained. Cages can be disinfected by rinsing at a temperature of 82.2°C (180°F) or higher for a period long enough to ensure destruction of vegetative pathogenic organisms. Disinfection can also be accomplished with appropriate chemicals; equipment should be rinsed free of chemicals prior to use. Periodic microbiologic monitoring is useful to determine the efficacy of disinfection or sterilization procedures. Accumulations of detergents, acid-cleaning solutions, volatile decontamination vapors, and other cleaning and disinfection agents may be harmful to animals, personnel, and the environment. Appropriate measures should be taken to protect personnel and comply with legal requirements.

The use of mechanical equipment-washing machines is highly recommended. The machines should provide wash and rinse cycles, preferably with adjustable time settings for each. If sanitization depends on heat for effectiveness, the equipment should be able to supply rinse-water temperatures of at least 82.2°C (180°F). Wash-water temperature might be considerably lower, depending on the detergent being used. The performance of cage-washing machines should be evaluated periodically.

Large pieces of equipment can be washed by hand; however, portable cleaners that dispense detergent and hot water or steam under pressure are more efficient. Some institutions wash cage racks in a specially constructed booth in the cage-washing area. An area of this type serves well when equipped with hot and cold water, steam, a detergent dispenser, and a vent to exhaust steam. If the size of the institution warrants such an investment, a large washing machine for racks, large animal cages, and other large pieces of equipment is useful. If no machine is available, small cages can be washed by hand in a sink or tub with appropriate detergents, disinfectants, and vigorous scrubbing.

Water bottles, sipper tubes, stoppers, and other watering equipment

should be washed and then sanitized by rinsing with water of at least 82.2°C (180°F) or appropriate chemical agents (e.g., hyperchlorite) to destroy pathogenic organisms. A machine for washing bottles and sippier tubes is recommended if large numbers of water bottles are used. Some cage-washing machines also can be used for this purpose. If bottles are washed by hand, powered rotating brushes at the washing sink are useful, and provision should be made for dipping or soaking the water bottles in detergent and disinfectant solutions. A two-compartment sink or tub is adequate for this purpose. Lines of automatic watering systems can harbor bacteria and require periodic flushing with water or appropriate chemical antibacterial agents, followed by thorough rinsing to remove chemicals.

Some means for sterilizing equipment and supplies, such as an autoclave or gas sterilizer, is essential when pathogenic organisms are present or for some specialized facilities or animal colonies. Routine sterilization of cages, food, and bedding is not considered essential if care is taken to use clean materials from reliable sources. Where hazardous biological, chemical, or physical agents are used, a system of equipment monitoring might be appropriate.

Deodorizers or chemical agents should not be used to mask animal odors. Such products are not a substitute for good sanitation, and some have been shown to cause changes in microsomal enzymes (Cinti et al., 1976).

Waste containers and implements should be cleaned frequently. It is good practice to use disposable liners and to wash each waste can frequently using the methods suggested above.

Waste Disposal

Wastes should be removed regularly and frequently. All waste should be collected and disposed of in a safe and sanitary manner. One method of waste disposal is incineration. Incinerators should be in compliance with all federal, state, and local regulations.

Waste cans, if used, should be metal or plastic, leak-proof, and equipped with tight-fitting lids. Waste cans containing animal tissues, carcasses, and hazardous wastes should be lined with leak-proof, disposable liners. If wastes must be stored before removal, the waste storage area should be separated from other storage facilities and free of flies, cockroaches, rodents, and other vermin. Cold storage might be necessary to reduce decomposition of biological wastes.

The federal government and most states and municipalities have statutes or ordinances controlling disposal of wastes. Compliance with

these regulations is an institutional responsibility (see Chapter I, "Animal Experimentation Involving Hazardous Agents"). Hazardous wastes should be rendered safe by sterilization, containment, or other appropriate means before they are removed from an animal facility. The National Safety Council has recommended procedures for disposal of potentially hazardous wastes (NSC, 1979).

Vermi

Programs should be instituted to control, eliminate, or prevent infestation by pests such as cockroaches, flies, and wild or escaped rodents. The most effective program prevents entry of vermin into the facility by screening openings, sealing cracks, and eliminating breeding and refuge sites. Improper use of pesticides can induce toxic effects in research animals (Hodgson, 1980) and interfere with experimental procedures. Whenever possible, relatively nontoxic compounds (e.g., boric acid) or drying substances (e.g., amorphous silica gel) should be used to control cockroaches. Pesticides should be used in animal areas only when necessary and then only after consultation with the investigator(s) whose animals will be exposed to them. Application of pesticides should be recorded and coordinated with the animal care management staff and in compliance with federal, state, or local regulations.

IDENTIFICATION AND RECORDS

Methods of animal identification include room, rack, and cage cards; collars, bands, plates, and tabs; colored stains; ear notches and tags; tattoos; and freeze brands. Records on experimental animals are essential and can take a variety of forms, ranging from limited information on identification cards to detailed reports on individual animals. Identification cards should include such information as the source of the animals, strain or stock, names and locations of the responsible investigators, and pertinent dates. Research protocols sometimes require records on individual animals. Individual clinical records can also be valuable, especially for dogs, cats, nonhuman primates, and farm animals. They should include a history of surgical procedures, experimental use, and pertinent clinical and diagnostic information. The source and eventual disposition of animals is often valuable and sometimes essential information, which should be included in individual records as required.

EMERGENCY, WEEKEND, AND HOLIDAY CARE

In the event of an emergency, institutional security personnel and fire or police officials should be able to contact those people responsible for the animals. This can be accomplished by prominently posting names and phone numbers in animal facilities or by listing them with the security department or telephone center.

Animals should be observed and cared for by qualified personnel every day, including weekends and holidays, both to safeguard their well-being and to satisfy research requirements. A procedure should be established for providing emergency veterinary care after work hours, on weekends, and on holidays.

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3

Veterinary Care

Veterinary care is an essential part of an animal care program. Adequate veterinary care consists of:

- observing all animals daily to assess their health and welfare;
- using appropriate methods to prevent, control, diagnose, and treat diseases and injuries;
- providing guidance to users regarding handling, immobilization, anesthesia, analgesia, and euthanasia; and
- monitoring surgery programs and postsurgical care.

Veterinary care is the responsibility of a veterinarian who is certified (see ACLAM, Appendix B) or has training or experience in laboratory animal science and medicine. Daily observation of animals can be accomplished by someone other than a veterinarian; however, a mechanism of direct and frequent communication should be adopted so that timely and accurate information on problems in animal health, behavior, and well-being is conveyed to the attending veterinarian. The veterinarian can also contribute to the establishment of appropriate policies and procedures for ancillary aspects of veterinary care, such as advising on experimental models; reviewing protocols and proposals with respect to veterinary care, animal husbandry, and animal welfare; monitoring occupational health, hazard containment, and zoonosis control programs; and supervising animal nutrition, husbandry, and sanitation.

PREVENTIVE MEDICINE

Prevention of disease should be the primary objective of a veterinary care program. In addition to good husbandry practices, there are a variety of activities that should be included in a preventive medical program.

Animal Procurement

All animals must be acquired lawfully. An evaluation should be made of animal quality for each potential vendor. A health surveillance program for screening incoming animals is recommended to assess animal quality. Methods of transportation should also be taken into account. Each shipment of animals should be inspected for compliance with procurement specifications, and the animals should be quarantined and stabilized according to procedures appropriate for the species and circumstances. Vendor quality-control data can be helpful in selecting these procedures.

Quarantine and Stabilization

Quarantine is the separation of newly received animals from those already in the facility until the health of the newly received animals has been evaluated. Effective quarantine minimizes the introduction of disease agents into established colonies. The veterinarian should formulate standard operating procedures to evaluate the health status of newly received, quarantined animals in accordance with acceptable veterinary medical practice and federal, state, and local regulations.

Quality control by the vendor and a knowledge of the history of the animals are acceptable parts of an institution's quarantine protocol. This information may limit the quarantine period for rodents to the time necessary for inspection on arrival; however, all newly received animals should be allowed a stabilization period prior to their use. This permits animals to adapt to their surroundings, resulting in a more stable physiological and behavioral state. The need for this stabilization period has been demonstrated in mice (Wallace, 1976; Landi et al., 1982), rats (Jelinek, 1971), and guinea pigs (Prasad et al., 1978) and is probably required for other species as well. If the history of newly received animals is incomplete, the quarantine procedure should be more comprehensive and of sufficient duration to allow expression of diseases present in the incubation stages. Some or all of the following should be achieved during the quarantine and stabilization period:

- diagnosis, control, prevention, and treatment of diseases, including zoonoses;
- physiognomical and nutritional stabilization; and
- grooming, including bathing, dipping, and clipping, as required.

Separation by Species, Source, and Health Status

Physical separation of animals by species is generally recommended to prevent interspecies disease transmission, reduce anxiety due to interspecies conflict, and meet experimental requirements. This is usually accomplished by housing different species in separate rooms. In some situations it might be appropriate to house different species of rodents in the same room, such as when they are to be used for similar studies and have a similar health status or when special containment is provided within rooms (e.g., laminar flow cabinets or filtered or microisolation cages). Intraspécies separation is advisable when animals obtained from multiple sources differ in microbiological status.

Separation to Avoid Interspecies Disease Transmission

Some species carry subclinical or latent infections that can cause clinical disease or be fatal when transmitted to other species. A few examples are provided as a guide in determining the need for separate housing by species:

- *Rodents*. Rats infected with *Streptobacillus moniliformis* (Freundt, 1956) should be housed separately from mice, which are usually free from this disease.
- *Lagomorphs*. Rabbits frequently harbor *Pasterella multocida* and *Bordetella bronchiseptica* (Flatt, 1974). These microorganisms are potentially pathogenic to other animals; guinea pigs are especially susceptible to *B. bronchiseptica*. Although definitive studies demonstrating transmission of these agents between rabbits and other species have not been reported, it seems prudent to maintain rabbits in separate rooms.
- *Nonhuman Primates*. As a rule, New World (South American), Old World African, and Old World Asian species of nonhuman primates should be housed in separate rooms. Benign epidemic monkey pox and simian hemorrhagic fever are two subclinical infections of African species that can cause clinical disease in Asian species (Hall and McNulty, 1967; Palmer et al., 1968; London, 1977). Certain species should be housed in separate rooms even though they are from the same species.

same geographical region. Squirrel monkeys (*Saimiri sciureus*), for example, are often latently infected with *Herpesvirus lamarmosi*, which can be transmitted to owl monkeys (*Aotus trivirgatus*) (Hunt and Melendez, 1966) and some species of marmosets (*Saguinus* spp.) (Holmes et al., 1964) and cause a fatal epizootic disease.

Separation by Source or Microbiological Status

It is not uncommon for animals from one source to harbor microbial agents not found in animals from another source, e.g., rats with *Mycobacteria pulmonis*. Therefore, it is recommended that animals from different sources be housed in separate rooms or that some other means, such as laminar flow units, be used to minimize the possibility of cross-infections. If such housing is not feasible because of space limitations or experimental objectives, animals should be grouped according to their known exposure to microbial agents.

SURVEILLANCE, DIAGNOSIS, TREATMENT, AND CONTROL OF DISEASE

All laboratory animals should be observed daily for signs of illness, injury, or abnormal behavior by a person trained to recognize such signs. Unexpected deaths and deviations from normal should be reported promptly to the person responsible for animal disease control. Sick or injured animals should receive prompt veterinary medical care. Animals that are suspected of having a contagious disease should be isolated from healthy animals in the colony. When an entire group or room of animals is known or believed to be exposed to an infectious agent, the group should be kept intact during the process of diagnosis, treatment, and control.

Methods of prophylaxis, diagnosis, therapy, and disease control should follow currently accepted practice. Diagnostic laboratory services supplement physical examination and facilitate diagnosis of diseases. These services should include gross and microscopic pathology, clinical pathology, hematology, microbiology, clinical chemistry, and other appropriate laboratory procedures.

Inapparent viral infections of rodents, which can occur with mouse hepatitis virus, minute virus of mice, and lactic dehydrogenase virus, can have an effect on some types of research (Hsu et al., 1980). Although there are usually no clinical signs in rodents infected with these viruses, there are often profound changes in the immune, reticuloendothelial, and other systems (Hsu et al., 1980). Serological

surveillance of rodent colonies, particularly breeding colonies, should be considered when there is a potential for inapparent viral infections to affect research results. Viral infections can also be transmitted through transplantable tumors and cell lines (Stansly, 1965; Collins et al., 1972; Biggar et al., 1976; Riley et al., 1978), which should be evaluated prior to their introduction into a research colony.

ANESTHESIA AND ANALGESIA

The proper use of anesthetics, analgesics, and tranquilizers in laboratory animals is necessary for humane and scientific reasons. In accordance with the Animal Welfare Act, the choice and use of the most appropriate drugs are matters for the attending veterinarian's professional judgment. The veterinarian must provide research personnel with guidelines and advice concerning choice and use of these drugs.

If a painful procedure must be conducted without the use of an anesthetic, analgesic, or tranquilizer—because such use would defeat the purpose of an experiment—the procedure must be approved by the committee and supervised directly by the responsible investigator. Muscle relaxants or paralytic drugs (e.g., succinylcholine or other curariform drugs) are not anesthetics. They must not be used alone for surgical restraint, although they can be used in conjunction with drugs known to produce adequate anesthesia.

SURGERY AND POSTSURGICAL CARE

Aseptic surgery should be conducted only in facilities intended for that purpose. These facilities must be maintained and operated to ensure cleanliness and directed by trained personnel. Surgery must be performed or directly supervised by trained, experienced personnel. Training in aseptic surgery should be provided for those who require it.

Aseptic technique must be used on most animals, including lagomorphs, that undergo major survival surgery. This technique includes wearing of sterile surgical gloves, gowns, caps, and face masks; use of sterile instruments; and aseptic preparation of the surgical field. Major survival surgery is defined as any surgical intervention that penetrates a body cavity or has the potential for producing a permanent handicap in an animal that is expected to recover. Survival surgery on rodents does not require a special facility but should be performed using sterile instruments, surgical gloves, and aseptic procedures to prevent clinical infections.

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Appropriate facilities and equipment should be available for postsurgical care. Postsurgical care should include observing the animal to ensure uneventful recovery from anesthesia and surgery; administering supportive fluids, analgesics, and other drugs as required; providing adequate care for surgical incisions; and maintaining appropriate medical records. Equipment and supply items that can be helpful for intensive care include heating pads, vaporizers, vacuum equipment, respirator, cardiac monitor, and oxygen. Proper monitoring by trained personnel should be provided during recovery. Minor surgical procedures, such as wound suturing and peripheral vessel cannulation, can be performed under less stringent conditions if they are performed in accordance with standard veterinary practices.

EUTHANASIA

For the purpose of this Guide, euthanasia is the procedure of killing animals rapidly and painlessly. It should be carried out by trained personnel using acceptable techniques in accordance with institutional policies and applicable laws. The method used should not interfere with postmortem evaluation.

Techniques for euthanasia usually should follow current guidelines established by the American Veterinary Medical Association Panel on Euthanasia (AVMA, 1978). Other methods must be reviewed and approved by the institutional veterinarian. Acceptable methods of euthanasia are those that initially depress the central nervous system to ensure insensitivity to pain (Canadian Council on Animal Care, 1980). For this reason, anesthetic agents are generally acceptable, and animals of most species can be killed quickly and humanely by intravenous or intraperitoneal injection of an overdose of barbiturates. Other methods can be used for euthanasia of anesthetized animals because the major criterion of humane treatment has been fulfilled (Lücke, 1979).

Physical methods of euthanasia are acceptable for some small animals (e.g., cervical dislocation in mice); however, for larger animals physical methods should be scientifically justified and restricted to those causing rapid death. Carbon dioxide in an uncrowded chamber has been found satisfactory for several different species. Although ether is effective it must be used with care, because it is flammable and explosive and for safe use requires special precautions. Signs indicating that ether is present or in use should be posted conspicuously. To avoid explosions, the carcasses of ether-killed animals should be stored in explosion-safe refrigerators and should not be incinerated

until the ether is volatilized. Chloroform should not be used because it is toxic to personnel and potentially carcinogenic. Every attempt should be made to perform euthanasia on animals in a manner that minimizes reactions among other living animals. Proper euthanasia technique should include a follow-up examination to confirm the absence of a heartbeat, which is a reliable indicator of death. Monitoring respiration is not sufficient. In some animals, particularly under deep carbon dioxide anesthesia, heartbeat can be maintained after visible respiration has ceased, and the animal might eventually recover.

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The physical condition and design of animal facilities determine, to a great extent, the efficiency and economy of their operation. The design and size of an animal facility depend on the scope of institutional research activities, animals to be housed, physical relationship to the rest of the institution, and geographic location. A well-planned, properly maintained facility is an important element in good animal care. The animal facility must be designed and constructed in accordance with all applicable state and local building codes.

PHYSICAL RELATIONSHIP OF ANIMAL FACILITIES TO LABORATORIES

Good animal husbandry and human comfort and health protection require separation of animal facilities from personnel areas such as offices, conference rooms, and most laboratories. This separation can be accomplished by having the animal quarters in a separate building, wing, floor, or room. In designing animal facilities, efficiency and economy in utilizing researchers' time should be taken into consideration, as well as research needs. Careful planning should make it possible to place animal housing areas adjacent to or near laboratories, but separated from them by barriers such as entry locks, corridors, or floors. Modular units, such as specially designed trailers or prefabricated structures, should be in accord with the construction guidelines described later in this chapter.

If animals must be maintained in a laboratory area to satisfy a research protocol, the area must be appropriately prepared to house and care for the animals. Animals should not be housed in laboratories merely for convenience.

FUNCTIONAL AREAS

The size and nature of a facility will determine whether areas for separate service functions are possible or necessary. Sufficient animal area is required to:

- ensure separation of species or isolation of individual projects when necessary:
 - receive, quarantine, and isolate animals; and
 - provide for animal housing.
- In facilities that are small, maintain few animals, or maintain animals under special conditions (e.g., facilities exclusively used for housing germfree colonies or animals in runs and pens), some functional areas listed below could be unnecessary or included in a multipurpose area. Professional judgment must be exercised when developing a practical system for animal care. Generally, facilities should make provisions for the following service functions:
 - specialized laboratories or individual areas contiguous with or near animal housing areas for such activities as surgery, intensive care, necropsy, radiography, preparation of special diets, experimental manipulation, treatment, and diagnostic laboratory procedures
 - containment facilities or equipment, if hazardous biological, physical, or chemical agents are to be used
 - receiving and storage areas for food, bedding, pharmaceuticals and biologics, and supplies
 - space for the administration, supervision, and direction of the facility
 - showers, sinks, lockers, and toilets for personnel
 - an area separate from animal rooms for eating, drinking, smoking, and applying cosmetics
 - an area for washing and sterilizing equipment and supplies and, depending on the volume of work, machines for washing cages, bottles, glassware, racks, and waste cans; a utility sink; an autoclave for equipment, food, and bedding; and separate areas for holding soiled and clean equipment
 - an area for repairing cages and equipment
 - an area to store wastes prior to incineration or removal

CONSTRUCTION GUIDELINES

Building materials should be selected to facilitate efficient and hygienic operation of animal facilities. Durable, moisture-proof, fire-resistant, seamless materials are most desirable for interior surfaces. Paints and glazes, in addition to being highly resistant to the effects of chemical solvents, cleaning agents, and scrubbing, should be highly resistant to the effects of high pressure sprays and impact. They should be nontoxic if used on surfaces that come into direct contact with animals.

Corridors

Corridors should be wide enough to facilitate the movement of personnel and equipment. Experience has shown that 7 ft (2.1 m) is a practical width for corridors in most facilities. Floor-wall junctions should be coved to facilitate cleaning. Curbs, guardrails, or bumpers should be installed to protect walls from damage, and exposed corners should be reinforced with steel or other durable material. Corridors leading to dog kennels should be provided with noise traps, such as double-door entry locks. Wherever possible, such utilities as water-lines, drainpipes, and electrical connections should be accessible through service panels or shafts in corridors outside the animal rooms.

Animal Room Doors

Doors should open into animal rooms; however, if it is necessary that they open toward a corridor, there should be recessed vestibules. Metal or metal-covered doors with viewing windows are preferable. Experience has shown that doors of at least 42 in (106.7 cm) wide and 84 in (213.4 cm) high are suitable for passage of racks and equipment. They should fit tightly within their frames, and both doors and frames should be completely sealed to prevent the entrance or harboring of vermin. Self-sealing sweep strips are desirable. Doors should be equipped with locks and kickplates and be self-closing. Recessed or shielded handles and locks are recommended.

Exterior Windows

Exterior windows and skylights are not recommended in animal rooms because they can contribute to unacceptable variations in environmental characteristics such as temperature and photoperiod.

Floors
 Floors should be smooth, moistureproof, nonabsorbent, and skid-proof, and be resistant to wear, acid, solvents, and the adverse effects of detergents and disinfectants. They should be capable of supporting racks, equipment, and stored items without becoming gouged, cracked, or pitted. Depending on the functions performed in specific areas, floor materials should be monolithic or have a minimum number of joints. Some materials that have proved satisfactory are epoxy aggregates, smooth hard-surfaced concrete, and special hardened rubber-base aggregates. Other synthetic products might also be satisfactory. A continuous moisture-proof membrane might be needed. If sills are installed at the entrance to a room, they should be designed to allow for convenient passage of equipment.

Drains

Floor drains might not be essential in all animal rooms, particularly those housing rodents. Floors in such rooms can be maintained satisfactorily by wet vacuuming or mopping with appropriate disinfectants or cleaning compounds. If floor drains are used, tile floors should be sloped and drain traps kept filled with water. To prevent high humidity, drainage must be adequate to allow rapid removal of water and drying of surfaces (Gorton and Besch, 1974). Drainpipes should be at least 4 in (10.2 cm) in diameter. The recommended minimum pitch of sloped floors is 0.25 in/ft (2.1 cm/m). In heavy-use areas, such as dog kennels, rim flush drains at least 6 in (15.2 cm) in diameter are recommended. A rim flush drain or heavy duty disposal set in the floor is an effective aid for the disposal of solid waste. A porous trap bucket in the drain can also be used to screen out solid waste. All drainpipes should have short runs to the main or be steeply pitched from the opening. When drains are not in use they should be capped and sealed to prevent backflow of sewer gases and other contaminants. Lockable drain covers are advisable for preventing the use of the drains for disposal of materials that should be cleaned up and removed by other means.

and disinfectants and the impact of water under high pressure. Walls should be protected from damage by movable equipment.

Ceilings

Ceilings should be smooth, moisture-proof, and free of imperfect junctions. Surface materials should be capable of withstanding scrubbing with detergents and disinfectants. Ceilings of plaster or fire-proof plaster-board should be sealed and finished with a washable paint. Ceilings formed by the concrete floor above are satisfactory if properly smoothed, sealed, and painted. Generally, suspended ceilings are undesirable unless they are fabricated from impervious materials and free of imperfect junctions. Exposed pipes and fixtures are undesirable.

Temperature and Humidity Control

Temperature and humidity control prevents variations due to changing climatic conditions or differences in the number and kind of room occupants. Air conditioning is an effective means of regulating these environmental parameters. Ideally, capability should be provided to allow individual adjustments in dry-bulb temperature of $\pm 1^{\circ}\text{C}$ ($\pm 2^{\circ}\text{F}$) within the range of approximately 18 to 29°C (64.4 to 84.2°F), which includes the temperature ranges recommended for common laboratory animals (see Chapter 2, Table 2-2). The relative humidity should be controllable within the range of 30% to 70% throughout the year, depending on dry-bulb temperature and the needs of the species housed. The range of temperature and humidity adjustments can be reduced in institutions in which the entire animal facility or extensive portions thereof are designed for species with similar requirements. Each animal room or group of rooms serving a common purpose should have controls for regulating dry-bulb temperature.

Ventilation

Ventilation requirements for laboratory animals are discussed in Chapter 2. In renovating existing or in building new animal facilities, consideration should be given to the ventilation of the animals' primary enclosures. Equipment reliability is very important. Heating, ventilating, and air-conditioning systems should be designed so that operation can be continued, even at reduced capacity, in event of failure of the primary

Walls

Walls should be free of cracks, unsealed utility penetrations, or imperfect junctions with doors, ceilings, floors, and corners. Surface materials should be capable of withstanding scrubbing with detergents

system. A means for monitoring the system should be established. The animal facility and human occupancy areas should be ventilated separately (Besch, 1980).

Power and Lighting

The electrical system should be safe and provide appropriate lighting and a sufficient number of power outlets. In rooms where explosive anesthetics are used, outlets should be explosion-proof and located at least 5 ft (1.52 m) off the floor. Moisture-proof switches and outlets should be installed where water is used in cleaning.

It is suggested that a lighting system be installed that provides adequate illumination while people are working in the animal rooms and a lowered intensity of light for the animals (see Chapter 2). Light fixtures should be properly sealed to prevent harboring vermin and either surface mounted on or recessed in the ceiling. Fluorescent lights are efficient and available in a variety of acceptable fixtures. A time-controlled lighting system should be used to ensure a regular diurnal lighting cycle. Timer performance should be checked regularly to ensure proper cycling. Emergency power should be available in the event of a power failure.

A separate vermin-proof area or room in which food and bedding can be stored should be available. This space can be held to a minimum in areas where delivery schedules are reliable. Food and other storage areas should be separated from refuse areas (see Chapter 2).

Refrigerated storage, separated from other cold storage, is essential for storage of dead animals and animal tissue waste. This storage area should be kept below 7°C (44.6°F) to reduce putrefaction of wastes or animal carcasses. The area should be so constructed that it can be kept clean and free of vermin.

Adequate space is required for storage of unused equipment. This area also should be built so that it can be kept clean and free of vermin.

Noise Control

Noise control is an important consideration in designing an animal facility (see Chapter 2). Concrete walls are more effective than metal or plaster walls in containing noise because their density reduces sound transmission. The elimination of windows also helps to contain sound.

Generally, acoustical materials applied directly to the ceiling or as part of a suspended ceiling of an animal room presents problems in sanitation and vermin control and is not recommended. However, newer sound-attenuating materials bonded to walls or ceilings might be appropriate for noise control. Experience has shown that well-constructed corridor doors (e.g., double-door air locks) can help control the transmission of noise along hallways.

Facilities for Sanitizing Equipment and Supplies

An area for sanitizing cages and ancillary equipment is essential. It is best if there is a central area specifically designed for the purpose. Consideration should be given to such factors as the following:

- location with respect to animal rooms and storage areas;
- ease of access, including doors wide enough to ensure free movement of equipment;
- traffic flow that separates "clean" and "dirty" areas;
- sound-proofing;
- insulation of walls and ceilings where necessary;
- utilities such as hot and cold water, steam, floor drains, and electrical power; and
- ventilation, including installation of proper vents and provision for dissipation of steam and fumes from sanitizing processes.

ASEPTIC SURGERY

Functional areas for aseptic surgery should include a separate surgical support area, a preparation area, the operating room or rooms, and an area for intensive care and supportive treatment of animals. The interior surfaces of this facility should be constructed of materials that are impervious to moisture and easily cleaned. The surgical support area should be designed for storing instruments and supplies and for washing and sterilizing instruments. Items that are used on a regular basis, such as anesthetic machines and suture materials, can be stored in the operating room.

There should be a separate surgical preparation area for animals. An area equipped with surgical sinks should be close to, but apart from, the operating room. A dressing area should be provided for personnel to change into surgical attire. If explosive anesthetic agents are to be used, floors should be conductive and outlets should be explosion-proof and located not less than 5 ft (1.52 m) off the floor. Provision should be made for scav-

5 Special Considerations

enging or exhausting waste gases from anesthesia machines. Explosion-proof hoods are preferable if volatile, explosive agents like ether are to be used. Consideration should be given to providing positive air pressure in the operating room to reduce contamination.

A separate facility for rodent surgery is not necessary. A rodent surgical area can be a room or portion of a room that is easily sanitized and not used for any other purpose during the time of surgery.

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GENETICS AND NOMENCLATURE

Genetic characteristics are among the most important factors to be considered in selecting animals for use in biomedical research. Inbred strains of various species, especially rodents, have been developed to address specific research needs (Festing, 1979; Gill, 1980). The homozygosity of these animals must be maintained to ensure the reproducibility and comparability of experimental data. Management systems (Green, 1981) should be designed to minimize genetic drift and genetic contamination resulting from mutation or mating. It is important to monitor inbred animals periodically for genetic homozygosity (Festing, 1982). Several methods of monitoring have been developed that use immunological, biochemical, and morphometric parameters (Groen, 1977; Festing and Lovell, 1980; Festing and Totman, 1980; Hoffman et al., 1980; Cramer, 1983).

Outbred animals are also used in biomedical research (Gill, 1980). To facilitate direct comparison of research data derived from outbred stocks, these animals must be maintained by breeding schemes designed to maximize genetic heterogeneity (Polley, 1960; Festing et al., 1972).

Accurate identification, using standardized nomenclature where it is available, and recording both the strain and substrain or the genetic background of all animals used in a research project are important (ILAR, 1979). Several publications provide rules developed by international committees for standardized nomenclature for outbred ro-

dents and rabbits (Festing et al., 1972), inbred rats (Festing and Staats, 1973; Gill, 1984), and inbred mice (International Committee on Standardized Genetic Nomenclature for Mice, 1981a,b,c).

FACILITIES AND PROCEDURES FOR ANIMAL RESEARCH WITH HAZARDOUS AGENTS

Special features and safety equipment are needed to protect the animal care staff, other occupants of the facility, laboratory animals, and the environment from exposure to hazardous biological, chemical, and physical agents used in animal experimentation. Ventilated hoods and animal caging systems that minimize the escape of contaminants are primary barriers used to contain hazardous materials. Special features, such as air locks, negative air pressure, and air filters, are secondary barriers designed to protect against the accidental release outside the facility. However, special safety features are not substitutes for appropriate management and safe practices. Rather, they are complementary. As a general rule, safety depends on trained personnel, who rigorously follow safe practices.

Facilities for laboratory animals used for experimentation with hazardous agents should be physically separate from other animal housing and support areas, research and clinical laboratories, and facilities that provide patient care. These areas should be appropriately identified and access to them limited to authorized personnel. Such facilities should be designed and constructed to facilitate cleaning and housekeeping. A properly managed double corridor facility is very useful in reducing cross contamination (Sansone and Losikoff 1979).

Floor drains should be installed only when clearly needed. If floor drains are installed, the drain trap should always contain water or the drain should be effectively sealed by other means. Automatic trapping can be provided to ensure that traps remain filled.

In selecting specific safeguards for animal experimentation with hazardous agents, careful attention should be given to procedures for animal care and housing, agent storage and disbursement, dosage preparation and administration, waste and carcass disposal management, and personnel protection.

Experimental animals should be housed so that potentially contaminated food, feces, urine, and bedding can be handled in a controlled manner. The selection of appropriate animal caging systems and ventilated cabinets or hoods requires professional knowledge and judgment and depends on the nature of the hazardous agents under study.

type of animal used, and design of the experiment. Ventilated cabinets or hoods should be used for handling and administering hazardous agents and for necropsying contaminated animals.

Animal care personnel should wear laboratory-issued outerwear, consisting of a fully fastened jumpsuit or its equivalent, shoes or shoe covers, head covers, and gloves of suitable material. Clean clothing should be provided as necessary. Personnel should be encouraged to shower when they leave the animal care or dosage preparation areas. Under no circumstances should protective clothing and equipment be worn beyond the boundary of the animal facility. Personnel working in areas where exposure to potentially contaminated airborne particulate material or vapors might occur should be provided with suitable respiratory protection.

Recommended practices and procedures for work with some hazardous chemicals are described in the *NH Guidelines for the Laboratory Use of Chemical Carcinogens* (NIH, 1981). The *CDC/NIH (1984) publication Biosafety in Microbiological and Biomedical Laboratories* recommends practices and procedures, safety equipment, and facility requirements for working with hazardous biological agents. Guidelines for working with recombinant DNA molecules have been prepared by NIH (1984).

In addition to the recommendations in Chapter I, there should be appropriate methods for monitoring exposure to potentially hazardous biological, chemical, and physical agents (NIOSH, 1977-1979; CFR, 1984a,b). Protective devices and other appropriate safety measures should be consistent with modern practices.

FARM ANIMALS

Farm animals used in biomedical research, including cattle, sheep, goats, swine, and fowl, can be housed in conventional laboratory animal facilities, in hazardous agent containment facilities, or on farms. The factors, criteria, and considerations for caging and housing discussed in Chapter 2 apply to farm animals; however, animals on farms may be housed under less stringent conditions. This section deals with housing and management of biomedical research animals on farms.

In general, housing and management practices should be designed to provide optimal animal care. A basic requirement is protection against environmental extremes. In determining optimal care, the criterion should be animal well-being rather than the mere ability to survive and produce under adverse conditions such as climatic extremes or high population densities.

Thermal environment has a strong influence on farm animals. Physiological responses to the environment, thermoregulation, adaptation, and temperature zones have been reviewed by Hafez (1968), Folk (1974), and Monteith and Mount (1974). There is no standard temperature at which livestock must be maintained. In determining the appropriate temperatures for farm animals, numerous factors other than the dry-bulb temperature should be considered, including age, weight, feeding level, experience (acclimatization), and husbandry. Ideally the thermal environment should be viewed in terms of effective ambient temperature (NRC, 1981), which combines consideration of other climatic events such as wind, precipitation, humidity, and radiation. Recommendations for thermocomfort and thermoneutral zones, upper and lower critical temperatures, and lethal temperatures for several species have been reported by Webster (1974) and Sainsbury and Sainsbury (1979). Estimates of lower critical temperatures for sheep, cattle, swine, and poultry have been summarized (NRC, 1981).

For maximum performance and physiological stability, animals should be maintained in their thermocomfort zone—the temperature range at which animals show no particular preference for any specific location to keep warm or cool (Sainsbury and Sainsbury, 1979). If this is not possible at all times, at least they should be maintained in the thermoneutral zone when housed indoors and most of the time when housed outdoors. If the temperature falls below the lower critical temperature, animals will need to eat more, change their behavior (e.g., postural changes, huddling), change their hair disposition (piloerection), and reduce surface blood circulation to keep warm. If the temperature goes above the upper critical temperature, animals attempt to reduce heat production by lowering food consumption and productivity and by perspiring and panting.

There are several acceptable systems for holding animals on farms. These range from minimum protection (climatic housing) to total environmental control. The selection of the appropriate environment depends upon such factors as research and husbandry objectives; species, breed, age, and pelage or feathers; and climate.

Climatic housing can be outdoor or indoor and should provide animals the opportunity to protect themselves from wind, precipitation, and sun. Such housing is most suitable in moderate climates and for adult animals that have had sufficient opportunity to adapt to climatic stress. It can be used satisfactorily to house animals in cold climates if proper consideration is given to prevailing wind direction and if the drainage and bedding used are adequate to keep the animals

warm and dry. Climatic housing in cold climates is most appropriate for cattle, sheep, horses, some fowl, and adult swine. In temperate climates it is often possible to confine animals to paddocks or pastures without shelter other than that provided by trees, terrain, wind fences, or sun shades. Shade should be provided in feedlots and pastures in areas where summer temperatures reach 29.4°C (85°F) or higher. Loose housing of farm animals is defined as enclosed or partially enclosed buildings without powered ventilation or supplementary heat. Often animals are permitted unrestricted movement to larger outside pens or paddocks.

In environmentally controlled systems, the macro- and micro-environment are regulated as completely as required for the particular species. For animals housed indoors, provision should be made for minimizing horizontal drafts; removal of moist air, ammonia, hydrogen sulfide, and carbon dioxide; building insulation or supplementary heat, when appropriate; adequate sanitation; and waste disposal. Controlled environmental housing can be used for all animals, but it is especially appropriate for young animals, bedded animals, and live-stock requiring light control.

Design criteria and choice of construction materials for livestock housing should meet the needs for the specific research and management practices. To the extent possible, all material used for indoor facilities should be impervious to moisture, insects, and vermin. Concrete and metal are the preferred building materials. Wood can be satisfactory, but it must be properly painted and sealed if extensive cleaning and disinfection procedures are to be carried out. Adequate drainage is often difficult to obtain without concrete floors and paved lots. Large outdoor holding paddocks should have paved surfaces along the areas of greatest animal traffic, such as front of buildings. Feeding and watering areas should be paved or mounded to keep animals as dry and clean as possible. Floors and other paved surfaces should have textures that minimize slipping and possible injury. Fencing should be properly maintained to prevent injury. Ruminants require a resting area either in a well-drained outside area or bedded shelter. Control of air, temperature, relative humidity, air velocity, moisture, dust, light, gas accumulation, odors, space, and manure become of increasing concern in shifting from climatic housing to a totally controlled environment.

When animals are fed in groups, there should be sufficient trough space or feeding points to avoid undue competition for feed, especially if feed is restricted. Feeding space is determined by the size and number of animals that must eat at one time (Table 5-1). When animals

TABLE 5-1. (continued)

Species	Ad Libitum Feeding		
	Ration Feeding cm (in) ^a	Silage or Hay cm (in) ^a	Grain or cm (in) ^a
12-16 wk	488 (192)		
16-20 wk	762 (300)		
Adult	914 (360)		
Turkeys			
0-4 wk	762 (300)		
4-16 wk	1,219 (480)		
16-24 wk	1,524 (600)		

^aData from Larson, 1976 and Structures and Environment Subcommittee, 1983.

^bDimensions refer to linear centimeters (inches) of trough.

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are pastured, hay may be scattered on the ground. When they are more restricted, forage should be provided in a well-designed rack. This results in better forage utilization and minimizes transmission of disease agents and parasites.

An adequate water supply is also essential. Water sources should be easily accessible to animals of all ages. In cold climates, water sources should be protected or equipped with heating devices to prevent freezing. Feed and water equipment should be constructed of materials that can be easily and effectively cleaned.

Additional information regarding facilities and management of agricultural animals can be obtained from the *Midwest Plan Service Structures and Environment Handbook* (Structures and Environment Subcommittee, 1983) and from agricultural engineers or animal science experts at state agricultural extension services and land grant colleges and universities.

TABLE 5-1. Suggested Minimum Feeder Space for Grouped Farm Animals*

Species	Ad Libitum Feeding		
	Ration Feeding cm (in) ^a	Grain or Supplement cm (in) ^a	
		Animals Per Feeder Space	Per Animal
Cattle	46-55 (18-22)	10-15 (4-6)	7-10 (3-4)
	270 kg to adult	10-15 (4-6)	7-10 (3-4)
	Adult	10-15 (4-6)	7-10 (3-4)
Sheep and goats	46-55 (18-22)	10-15 (4-6)	7-10 (3-4)
	270 kg to adult	10-15 (4-6)	7-10 (3-4)
	Adult	10-15 (4-6)	7-10 (3-4)
Lambs and kids	23-30 (9-12)	10 (4)	
	Adult, small	10-15 (4-6)	
	large	15-20 (6-8)	
Swine	23-30 (9-12)	10 (4)	
	Adult, small	10-15 (4-6)	
	large	15-20 (6-8)	
Chickens	15-20 (6-8)	2	
	14-23 kg	20-25 (8-10)	
	23-34 kg	25-30 (10-12)	
Ducks	34-90 kg	30-40 (12-16)	
	Adult	50-60 (20-24)	
		Per 100 Birds	
Chickens	244 (96)	0-3 wk	
	305 (120)	3-6 wk	
	366 (144)	6-12 wk	

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APPENDIX

B

Professional and Certifying Laboratory Animal Science Organizations

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ANIMAL TESTING ALTERNATIVES

"Animal Testing Alternatives" is a new heading appearing for the first time in 1985 editions of the National Library of Medicine's catalogs and computer data bases. The heading will be used to index books, articles and audiovisual materials that describe lab procedures "used or advocated for use in place of procedures requiring live animals."

American Association for Accreditation of Laboratory Animal Care (AAALAC), 208A North Cedar Road, New Lenox, IL 60451 (815/485-7101).

This nonprofit corporation was formed in 1965 by leading U.S. scientific and educational organizations to promote high quality animal care and use through a voluntary accreditation program. Any institution maintaining, using, importing, or breeding laboratory animals for scientific purposes is eligible to apply for AAALAC accreditation. The animal care facilities of applicant institutions are visited and thoroughly evaluated by experts in laboratory animal science, who submit a detailed report to the Council on Accreditation. The council reviews applications and site visit reports, using the guidelines in the *Guide for the Care and Use of Laboratory Animals*, to determine whether full accreditation should be granted. Accredited facilities are required to submit annual reports on the status of their animal facilities, and site visits are conducted at intervals of 3 years or less. The Council on Accreditation reviews the annual and site revisit reports to determine whether full accreditation should be continued.

Fully accredited animal care facilities receive a certificate of accreditation and are included on a list of such facilities published in the association's Activities Report. Full accreditation by AAALAC is accepted by the National Institutes of Health as assurance that the animal facilities are in compliance with PHS policy.

American Association for Laboratory Animal Science (AALAS), 210 North Hammes Avenue, Suite 205, Joliet, IL 60435 (815/729-1161).

The American Association for Laboratory Animal Science is an organization made up of individuals and institutions professionally concerned with the production, care, and use of laboratory animals. It provides a means for collection and exchange of information on all phases of laboratory animal care and management. The association meets annually and publishes *Laboratory Animal Science* (a bimonthly journal), the *AALAS Bulletin*, and other documents. AALAS' Animal Technician Certification Board provides a means of developing uniform requirements for technician training by defining the qualifications, preparing and approving examinations for training programs, and certifying successful candidates.

American Veterinary Medical Association (AVMA), 930 North Meacham Road, Schaumburg, IL 60196 (312/885-8070).

The American Veterinary Medical Association (AVMA) is the major national organization of veterinarians. Its objective is to advance the science and art of veterinary medicine, including its relationship to public health and agriculture. The AVMA is the recognized accrediting agency for schools and colleges of veterinary medicine. It sponsors specialization in veterinary medicine through the formal recognition of specialty certifying organizations, including the American College of Laboratory Animal Medicine. The AVMA Committee on Animal Technician Activities and Training accredits 2-year programs in animal technology at institutions of higher learning throughout the United States. A list of accredited programs and a summary of individual state laws and regulations relative to veterinarians and animal technicians is available from the AVMA.

American College of Laboratory Animal Medicine (ACLAM), Dr. C. Max Lang, Secretary-Treasurer, Department of Comparative Medicine, The Milton S. Hershey Medical Center, The Pennsylvania State University, P.O. Box 850, Hershey, PA 17033 (717/534-8462).

The American College of Laboratory Animal Medicine is a specially board recognized by the American Veterinary Medical Association (AVMA). It was founded in 1957 to encourage education, training, and research; to establish standards of training and experience for qualification; and to certify, by examination, qualified laboratory animal specialists as diplomates. To achieve these goals, the college seeks

to interest veterinarians in furthering both training and qualifications in laboratory animal medicine.

ACLAM meets biannually in conjunction with the AVMA and the American Association for Laboratory Animal Science. It emphasizes and sponsors continuing-education programs; cosponsors symposia; and sponsors approximately 30 autotutorial programs on use, husbandry, and diseases of animals commonly used in research; and publishes texts, such as *The Laboratory Rat and The Mouse in Biomedical Research*.

American Society of Laboratory Animal Practitioners (ASLAP), Dr. Earol N. Tomson, Secretary-Treasurer, Lab Animal Resource Center, Washington State University, Pullman, WA 99164-1165 (509/335-6246).

ASLAP, founded in 1966, is open to any graduate of a veterinary college accredited or recognized by the American Veterinary Medical Association (AVMA) or Canadian Veterinary Medical Association (CVMA) who is engaged in laboratory animal practice and maintains membership in the AVMA, CVMA, or any other national veterinary medical association recognized by the AVMA. Its purpose is to disseminate ideas, experiences, and knowledge among veterinarians engaged in laboratory animal practice through education, training, and research at both pre- and postdoctoral levels. Two educational meetings are held annually, one each in conjunction with the annual meetings of the AVMA and American Association for Laboratory Animal Science.

C
APPENDIX
Some Federal Laws Relevant
To Animal Care and Use

8/29/90

new law seeks "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conservation of wild flora and fauna worldwide."

Regulatory authority under the Endangered Species Act is vested in the Secretary of the U.S. Department of the Interior (USDI) and implemented by USDI's Fish and Wildlife Service. Implementing rules and regulations are published in the CFR, Title 50 (Wildlife and Fisheries), Chapter 1 (U.S. Fish and Wildlife Service, Department of Interior). Subchapter B, Part 17 (Endangered and Threatened Wildlife and Plants). Copies of the regulations, including a list of species currently considered endangered or threatened, can be obtained by writing to the Office of Endangered Species, U.S. Department of Interior, Fish and Wildlife Service, Washington, DC 20240.

ANIMAL WELFARE

The Animal Welfare Act of 1966 (P.L. 89-544), as amended by the Animal Welfare Act of 1970 (P.L. 91-579) and 1976 Amendments to the Animal Welfare Act (P.L. 94-279), contains provisions to prevent the sale or use of animals that have been stolen; prohibit animal lighting ventures; and ensure that animals used in research, for exhibition, or as pets receive humane care and treatment. The law provides for regulating the transport, purchase, sale, housing, care, handling, and treatment of such animals.

Regulatory authority under the Animal Welfare Act is vested in the Secretary of the U.S. Department of Agriculture (USDA) and implemented by USDA's Animal and Plant Health Inspection Service (APHIS). Rules and regulations pertaining to implementation are published in the Code of Federal Regulations (CFR), Title 9 (Animals and Animal Products). Subchapter A (Animal Welfare), Parts 1, 2, and 3. Copies can be obtained from the Deputy Administrator, U.S. Department of Agriculture, APHIS-VS, Federal Building, 6505 Belcrest Road, Hyattsville, MD 20782.

ENDANGERED SPECIES

The Endangered Species Act of 1973 (P.L. 93-205; 87 Statute 884) became effective on December 28, 1973, supplanting the Endangered Species Conservation Act of 1969 (P.L. 91-135; 83 Statute 275). The

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APPENDIX

Public Health Service Policy and Government Principles Regarding The Care and Use of Animals

PUBLIC HEALTH SERVICE POLICY ON HUMANE CARE AND USE OF LABORATORY ANIMALS BY AWARDEE INSTITUTIONS

The Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals by Awardee Institutions was updated in 1985. In the policy statement, the PHS endorses the U.S. government "Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Education" (reprinted below), which were developed by the Interagency Research Animal Committee. The PHS policy implements and supplements these principles. Information concerning the policy can be obtained from the Office for Protection from Research Risks, National Institutes of Health, Building 31, Room 4B09, Bethesda, MD 20205.

PRINCIPLES FOR THE CARE AND USE OF ANIMALS USED IN TESTING, RESEARCH, AND EDUCATION

The principles below were prepared by the Interagency Research Animal Committee. This committee, which was established in 1983, serves as a focal point for federal agencies' discussions of issues involving all animal species needed for biomedical research and testing. The committee's principal concerns are the conservation, use, care, and welfare of research animals. Its responsibilities include information exchange, program coordination, and contributions to policy development.

Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research and Training

The development of knowledge necessary for the improvement of the health and well-being of humans as well as other animals requires *in vivo* experimentation with a wide variety of animal species. Whenever U.S. Government agencies develop requirements for testing, research, or training procedures involving the use of vertebrate animals, the following principles shall be considered; and whenever these agencies actually perform or sponsor such procedures, the responsible institutional official shall ensure that these principles are adhered to:

- I. The transportation, care, and use of animals should be in accordance with the Animal Welfare Act (7 U.S.C. 2131 et seq.) and other applicable Federal laws, guidelines and policies.
- II. Procedures involving animals should be designed and performed with due consideration of their relevance to human or animal health, the advancement of knowledge, or the good of society.
- III. The animals selected for a procedure should be of an appropriate species and quality and the minimum number required to obtain valid results. Methods such as mathematical models, computer simulation, and *in vitro* biological systems should be considered.
- IV. Proper use of animals, including the avoidance or minimization of discomfort, distress, and pain when consistent with sound scientific practices, is imperative. Unless the contrary is established, investigators should consider that procedures that cause pain or distress in human beings may cause pain or distress in other animals.
- V. Procedures with animals that may cause more than momentary or slight pain or distress should be performed with appropriate sedation, analgesia, or anesthesia. Surgical or other painful procedures should not be performed on unanesthetized animals paralyzed by chemical agents.

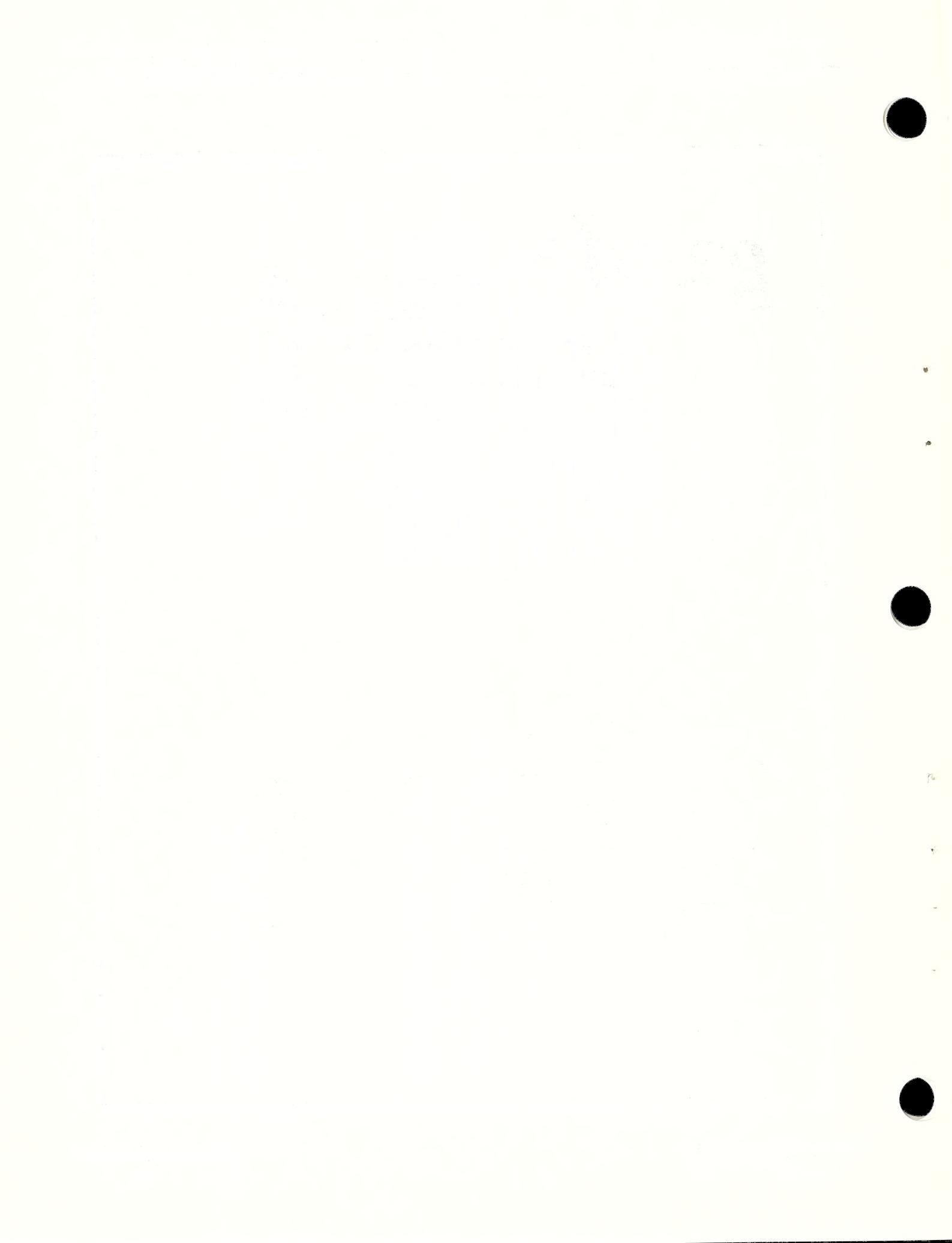
⁴For guidance throughout these Principles the reader is referred to the *Guide for the Care and Use of Laboratory Animals*, prepared by the Institute of Laboratory Animal Resources, National Research Council.

VI. Animals that would otherwise suffer severe or chronic pain or distress that cannot be relieved should be painlessly killed at the end of the procedure or, if appropriate, during the procedure.

VII. The living conditions of animals should be appropriate for their species and contribute to their health and comfort. Normally, the housing, feeding, and care of all animals used for biomedical purposes must be directed by a veterinarian or other scientist trained and experienced in the proper care, handling, and use of the species being maintained or studied. In any case, veterinary care shall be provided as indicated.

VIII. Investigators and other personnel shall be appropriately qualified and experienced for conducting procedures on living animals. Adequate arrangements shall be made for their in-service training, including the proper and humane care and use of laboratory animals.

IX. Where exceptions are required in relation to the provisions of these Principles, the decisions should not rest with the investigators directly concerned but should be made, with due regard to Principle II, by an appropriate review group such as an institutional animal research committee. Such exceptions should not be made solely for the purposes of teaching or demonstration.



guide

FOR THE CARE
AND USE OF
AGRICULTURAL ANIMALS
IN AGRICULTURAL RESEARCH
AND TEACHING

(CHAPTERS 5 THROUGH 11 ONLY)



Consortium for Developing
a Guide for the Care and
Use of Agricultural Animals
in Agricultural Research
and Teaching

First Edition
March 1988

*Consortium for Developing
A Guide for the Care and Use of
Agricultural Animals in Agricultural Research and Teaching*

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March 1988

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A Guide for the Care and Use of
Agricultural Animals in Agricultural Research and Teaching*

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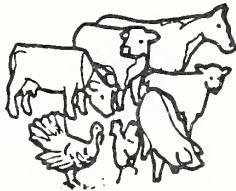
Consortium for Developing a Guide for the Care and Use of
Agricultural Animals in Agricultural Research and Teaching
(Further information inside back cover.)

Editorial and Production Services

Association Headquarters
309 West Clark Street
Champaign, IL 61820
217-356-3182

Price \$5.00 (handling and postage included). Available from Association Headquarters, 309 West Clark Street, Champaign, IL 61820.
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First Edition
March 1988



Consortium for developing a

**GUIDE FOR THE CARE AND USE OF AGRICULTURAL ANIMALS
IN AGRICULTURAL RESEARCH AND TEACHING**

Sponsoring Groups:

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Agricultural Animal Care Guide
Division of Agriculture, NASULGC
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202-778-0858

Dear Reader:

The Consortium organized to develop a *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* is pleased to publish this first edition of the guide. Since the use of animals is essential for many research and teaching programs, we hope this voluntary guide will be useful for agricultural researchers, instructors, and technicians who need agricultural animals for their programs.

This guide was developed by professional animal, dairy, and poultry scientists, agricultural engineers, and veterinarians who have had experience with the respective species. The members of the Consortium are indebted to Dr. Stan Curtis, University of Illinois, who served as Chairman of the Guide Development Committee; to the members of the Guide Development Subcommittees; and to the members of the Consortium Executive Committee for their dedicated and responsive leadership in consolidating the available scientific knowledge and professional opinion into practical recommendations. Essentially every potential user should have had an opportunity to review a provisional draft of this guide during the development phase and their suggestions were given careful consideration in preparing the final draft. These inputs are appreciated and contributed significantly to the overall success of the project.

Individuals who have questions or wish to make suggestions for improving the guide are encouraged to contact the Consortium Executive Committee at the above address. The Committee will carefully evaluate all suggestions received and will incorporate appropriate recommendations into the next edition of the guide.

Additional copies of the guide may be obtained at a cost of \$5.00 per copy from Association Headquarters, 309 West Clark Street, Champaign, Illinois 61820.

Sincerely,/

Irvin T. Omtvedt
Consortium Chairman

PREFACE

This is the first edition of the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*. It was developed by and for those who use agricultural animals for these purposes. The *Guide* is intended to serve agricultural academic institutions and research organizations as a primary reference on the care and use of the major agricultural animal species in the United States in research and teaching that, for reasons of scientific rigor and applicability of results, must be conducted in simulated or actual agricultural production settings. It is meant to serve as an independent reference for the care and use of agricultural animals just as the National Institutes of Health *Guide for the Care and Use of Laboratory Animals* (NIH, 1985) has served users of animals in biomedical research and teaching since it was first published (as the *Guide for Laboratory Animal Facilities and Care* in 1963). This *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* will be modified in the future in line with experience, changing conditions, and new knowledge.

This *Guide* provides information on the most common agricultural animals under a variety of teaching and research circumstances, including some of the more common animal production systems in different parts of the United States. It is not nor is it intended to be an exhaustive, inclusive review of all aspects of animal care and use, in terms of either the kinds of animals or the appropriate agricultural production systems to be employed in research or teaching. Supplemental information on the wide range of breeding, feeding, housing, and management of agricultural animals is available in other publications.

A group of organizations and agencies decided in May 1986 to develop this *Guide*. It established the Consortium for Developing a Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching.

Each member group¹ was represented on the consortium's Coordinating Committee, which also included a representative of the public. The Coordinating Committee met in Arlington, Virginia, on 2 July 1986. At that meeting, members of an Executive Committee were elected, and tentative appointees to the Guide Development Committee and six Guide Development Subcommittees were named.

Each of the Guide Development Subcommittees met in St. Louis, Missouri, twice: once in late summer 1986 and then all subcommittees at the same time on 10 and 11 November 1986. The Guide Development Committee met in Urbana, Illinois, on 9 January 1987.

Successive drafts of the *Guide* were critiqued by an ever larger circle of reviewers: 1) The members of respective subcommittees, together with members of the Guide Development Committee, reviewed the first drafts of the individual chapters. 2) In addition, the members of the Executive Committee reviewed the first revised individual chapters. 3) Then the chapters were amalgamated and revised, and members of all subcommittees and the Executive Committee reviewed this second revised version. 4) The third revised draft issued on 10 March 1987 was reviewed in addition by members of the entire Coordinating Committee. 5) All committee and subcommittee members were encouraged to solicit comments from colleagues on the fourth revised draft issued on 8 April 1987. 6) On 13 and 14 May 1987, members of the consortium's Coordinating and Guide Development Committees met in St. Louis, Missouri, to discuss the provisional final draft of the *Guide*. 7) During summer 1987, the provisional final draft was discussed in Chicago, Illinois, at the meeting of the Scientists Center for Animal Welfare; in Columbia, Missouri, at the annual meeting of the American Dairy Science Association; in Baltimore, Maryland, at the summer meeting of the American Society of Agricultural Engineers; in Logan, Utah, at the annual meeting of the American Society of Animal Science; in Chicago, Illinois, at the annual convention of the American Veterinary Medical Association; and in Corvallis, Oregon, at the annual meeting of the Poultry Science Association. 8) The Guide Development Committee, Executive Committee, and technical editor met on 5 and 6 October 1987 in St. Louis, Missouri, for final review of the document. 9) On 4 November 1987 two independent reviewers, William J. Benton and Wilson G. Pond, met with two members of the Executive Committee and offered final suggestions on the document.

¹American Dairy Science Association, American Feed Industry Association, American Meat Science Association, American Registry of Professional Animal Scientists, American Society of Agricultural Engineers, American Society of Animal Science, American Veterinary Medical Association, Animal Health Institute, Association of American Veterinary Medical Colleges, Experiment Station Committee on Organization and Policy, Extension Committee on Organization and Policy, Farm Animal Welfare Coalition, Forum for Animal Agriculture, Intersociety Committee on Animal Care, Poultry Science Association, Resident Instruction Committee on Organization and Policy, USDA Agricultural Research Service, USDA Animal and Plant Health Inspection Service, USDA Cooperative State Research Service, and USDA Extension Service.

The final document was submitted for publication on 23 November 1987.

The purpose of this *Guide* is to assist institutions and other organizations engaged in agricultural research and teaching in caring for and using agricultural animals in ways judged to be professionally and humanely appropriate. The recommendations are based on published data, scientific principles, expert opinion, or experience with methods and practices that have proven to be consistent with humane animal care and use.

Readers who wish to suggest improvements in this *Guide* are invited to contact the Consortium Executive Committee, Agricultural Animal Care Guide, Division of Agriculture, NASULGC, One Dupont Circle, N.W., Suite 710, Washington, DC 20036-1191.

ACKNOWLEDGMENTS

Many scientists, administrators, and government officers responded to the solicitation for existing laws, regulations, and policies at the national, state, and institutional and agency levels, both in the United States and abroad; these persons and materials were invaluable resources for the members of the *Guide* Development and Executive Committees in the early phases of this *Guide*. Further scores of librarians, clerks, and other workers were unfailingly helpful when called upon to provide necessary bits of information needed for completion of this work. And finally, the honest and insightful criticisms and suggestions of hundreds of interested people in all walks of life are gratefully acknowledged. Every such comment was considered in the writing of this document.

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INTRODUCTION

The ability of agricultural scientists to enhance the well-being of both agricultural animals and humans depends directly on the advancements made possible by research. This requires the use of experimental animals as well as the dissemination of new knowledge through various teaching programs, many of which also require the use of animals. The agricultural community has long recognized both a scientific and an ethical responsibility for the humane care of animals, and all who care for or use animals in agricultural research or teaching must assume responsibility for the animals' general welfare.

Today, institutions that wish to be eligible for US Public Health Service (PHS) research and training grants in which vertebrate animals will be used must file an assurance document with the Office of Protection from Research Risks. If an institution restricts its assurance document to those portions of its animal care program where PHS funds are expended, then PHS authority extends only to those areas, and PHS trusts that the institution will not conduct PHS-funded activities in its other facilities. However, if an institution assures the PHS that its total animal care program is being conducted in accord with PHS policy and the guidelines put forth in the *Guide for the Care and Use of Laboratory Animals* (NIH, 1985), then all of its animal care program—including its agricultural research and teaching facilities—is open to PHS scrutiny if there is an alleged problem in the biomedical area that results in a site visit. Pertinent PHS policy has been published in *Public Health Service Policy on Humane Care and Use of Laboratory Animals* (PHS, 1986).

It is especially important to recognize that the intent of agricultural research and teaching is to advance knowledge of immediate or potential benefit to agricultural animals and their production and those who consume the products of animal agriculture. Scientists have developed, and should continue to develop and use, scientifically valid adjunctive or alternative methods to animal use in agricultural research and teaching.

Institutional animal facilities and programs should be operated in accordance with the requirements and recommendations of this *Guide*, the *Guide for the Care and Use of Laboratory Animals*, and applicable federal, state, and local laws, regulations, and policies. Nothing in this *Guide* is intended to limit an investigator's freedom—in

deed, obligation—to plan and conduct animal experiments and demonstrations in accord with scientific and humane principles. It is envisioned that these guidelines will encourage agricultural scientists to continue their seeking of improved methods of animal care and use. Finally, it should be understood by all who use this *Guide* that it has been deliberately written in general terms so that the recommendations can be applied in the diverse institutions that use agricultural animals in agricultural research and teaching in the United States.

Professional judgment is essential in the application of these guidelines.

For the purposes of this *Guide*, agricultural animals include any warm-blooded vertebrate animal used in any instance of agricultural research or teaching for which the scientific objectives are to improve understanding of the animal's use in production agriculture and which may require that the animal be residing in a simulated or actual production agricultural setting. The *Guide for the Care and Use of Laboratory Animals* refers specifically and explicitly to a second category: "farm animals in the context of their use in biomedical research—not with their use in research on production agriculture." Neither set of guidelines is intended to pertain to animals being produced for commercial purposes.

Depending on the nature of the research or teaching objective, animal scientists and veterinary scientists must use different kinds of animal-holding facilities. Some projects require a carefully controlled environment. Others call for the wide range of variables found on actual farms and ranches. Still others have less stringent requirements than ordinarily are implied by either set of guidelines.

Agricultural animal species sometimes serve as models for humans in a variety of biomedical research projects and teaching demonstrations. Scientists in agricultural experiment stations and elsewhere are required to keep these animals in the same type of facility required for nonagricultural species used in similar experiments. The facilities for the care and use of these animals in this first category are described and discussed in the *Guide for the Care and Use of Laboratory Animals*.

The guidelines stated in this *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* refer primarily to a second category of animals residing in simulated or actual production agricultural

2

settings. In many cases, the facilities in which these animals reside must simulate conditions on commercial farms; otherwise, the results may be biased. The results of research and teaching conducted in inappropriate settings will be of little use. The pertinent systems include range or pasture production in naturalistic settings, various degrees of confinement in certain less extensive production systems, and various degrees of confinement in more intensive production systems, including enclosed

INTRODUCTION

housing.

Some scientific use of agricultural animals involves projects and demonstrations in a third category, those having agricultural objectives in the ultimate but employing methods that require neither the breadth of stimuli present in farm environments nor the environmental control typical of biomedical research. For this third category, a blending of guidelines is necessary, and here especially professional judgment is essential.

CHAPTER 5: GUIDELINES FOR BEEF CATTLE HUSBANDRY

"Beef cattle" refers to all animals of the genus *Bos* and their close relatives that are raised primarily for meat production (see Chapter 11 for veal production).

ENVIRONMENT AND FACILITIES

Genetic variation among cattle species, breeds, and individuals makes it possible for them to thrive in a wide range of natural conditions and artificial environments. When behavioral and physiological characteristics of cattle are matched to local conditions, beef cattle thrive in virtually any natural environment in the United States without artificial shelter. Protection, however, may be beneficial, especially for newborns, during adverse weather conditions. Beef production occurs in every state, cattle reside on pastures and ranges, in small dry-lot facilities, in a variety of different types of feedlots, and in confinement. Beef cattle research is conducted under conditions similar to each of these alternatives as well as in enclosed laboratory conditions. For additional information, see the *Structures and Environment Handbook* (MWPS, 1987a) and the *Beef Housing and Equipment Handbook* (MWPS, 1987b).

PASTURE AND RANGE SYSTEMS

Cattle on pasture and range are often monitored less directly and less frequently than cattle raised in other systems. Consequently, cattle in range and pasture systems are more likely to be affected by weather, predators, insects, internal and external parasites, poisonous plants, and inadequate feed. A beef cattle health care program should be planned to address potential problems as appropriate for local conditions.

FEEDLOT AND HOUSING SYSTEMS

Beef cattle used in research or teaching may be housed in intensive management systems, either indoors or in open lots, with or without overhead shelter. When facilities for beef cattle are developed, a consideration should be to provide the cattle with the opportunity for behavioral thermoregulation (e.g., access to a windbreak, sunshade, or roof).

Proper airflow and ventilation are essential in intensive facilities. In feedlots, cable or wire fencing has minimal

effect on natural airflow in summer. However, high airflow rates are undesirable in periods of low temperature, and tree shelterbelts and other types of windbreak can reduce the rate of airflow past the cattle. A windbreak 4 m (13 ft) high, 80% solid, reduces wind for about 65 m (200 ft) downwind and controls snow for about 10 m (30 ft). A windbreak in mounded south-sloping feedlots is recommended in the northern United States so that dry areas with low air velocities are available on which the cattle can rest.

In cold beef housing (see Chapter 4), one or more sides are open (usually the south or east, depending on prevailing winter winds in the locale). No artificial ventilation system is used in such a structure, and winter temperatures are usually 3 to 5 °C above outdoor conditions. In totally enclosed housing, ventilation acts to minimize accumulation of water vapor, noxious gases, and other odorous compounds and dust in the air and to maintain the air temperature at acceptable levels. Ventilation systems may be either natural or mechanical.

Type of pen surface is not important during dry weather, but it is very important during wet periods. Therefore, outside pens should have good drainage. In some cases, a hard surface apron in front of the feed bunks and around waterers and shelters is appropriate.

Dirt pens should be maintained to minimize accumulation of water. For hard-surfaced pens, materials should be durable, impervious to water and urine, easily cleaned, resistant to chemicals and corrosion from animal feed and waste, and slip-resistant. Concrete floors should be scored or grooved during construction to improve the animals' footing. Properly designed slotted floors are self-cleaning. Fences, pen dividers, walls, gates, and other surfaces must be strong enough to withstand direct animal contact and impact. Configuration and treatment of contact surfaces must minimize or eliminate protrusions, changes in elevation, and sharp corners to minimize bruising and improve the efficiency of cattle handling.

Proper lighting permits inspection of animals in feedlots and houses and provides safer working conditions for animal care personnel. Maintenance of facilities (e.g., repair of fences and equipment) should be timely and continuous.

ENCLOSED LABORATORY ENVIRONMENTS

Some agricultural research and teaching situations require that beef cattle be housed under intensive laboratory conditions. Cattle may be kept in pens, metabolism stalls, stanchions, respiration chambers, or environmental chambers. The physical facility must meet local environmental standards for air-pollutant emissions and liquid-solid waste effluent disposal systems.

Cattle used in space-intensive conditions should have calm dispositions and be adapted to frequent contact with animal care personnel. In some cases, it may be advantageous to train them to a halter. Time spent preparing such animals for use in a laboratory will improve the quality of research and safety for both animal and human.

Recirculation of exhaust air from animal rooms is not recommended. In facilities designed to recirculate even a small part of the exhausted air, treatment is necessary to remove odorous compounds, toxic gases, and particulate matter.

Unless the experimental protocol has special light requirements, illumination in all animal rooms should be uniform to minimize physiological effects of variation in light intensity. A diurnal light-dark cycle is desirable, and a standardized daily schedule enhances environmental predictability for the animals (Wiepkema, 1985).

Excreta ordinarily should be removed from enclosed laboratories at least once daily. Pens should be washed thoroughly at the outset of every trial and as needed thereafter. The method of feces and urine collection from cattle in metabolism stalls, stanchions, and chambers depends on the design and construction of the unit. Containers for collection of feces and urine should be kept clean.

Cattle maintained in some laboratory environments, have activity restricted more than do their counterparts in actual agricultural production settings. The length of time cattle may remain in stanchions, metabolism stalls, or environmental chambers before removal to a pen or outside lot for additional exercise should be based on professional judgment and experience. Six weeks is a typical period. Health and disposition of individuals should be monitored closely during such studies with particular attention given to alertness of the animal, appetite, feces and urine outputs, and condition of the feet, legs, and hock joints. Rubber mats or suitable bedding increase the comfort of animals maintained for long periods on hard floors.

FLOOR OR GROUND AREA

Area recommendations for open lots and barns are listed in Table 5-1. Every animal should have sufficient

space to move about at will, adequate access to feed and water and a dry resting site, and the opportunity to remain reasonably clean. Recommended area alone does not ensure that these conditions will be met; conversely, in some cases it is possible to meet these conditions with less than the recommended area. The amount of area required is affected greatly by factors such as type and slope of floor or soil surface, amount of rainfall, amount of sunshine, season, group size, and method of feeding.

Open feedlot pens need to be sloped to promote drainage away from feedbunks, waterers, pen dividers, and resting areas. Stocking capacity is related directly to slope. In temperate climates, the following relationships have been found workable (MWPS, 1987b): 2% slope, 37 to 74 m²/head (400 to 800 ft²/head); 2 to 4%, 23 to 37 m² (250 to 400 ft²); and 4% or greater, 14 to 23 m² (150 to 250 ft²). Stocking capacity may be higher in drier parts of the country. In the Southwest, at 0% slope, the typical stocking density is 14 to 23 m²/head (150 to 250 ft²/head). In wetter regions, stocking density may have to be reduced below Midwestern norms.

The area requirements for cattle are greatly influenced by group size. One animal housed separately in a pen requires the greatest amount of floor area on a per animal basis, and as group size increases, the amount of area required per individual decreases. When an animal is housed individually, the minimum pen width and length, respectively, should be at least the animal length from nose tip to tail head when the animal is standing in a normal erect posture.

Acceptable indoor pen floor surfaces for beef cattle include unfinished concrete, grooved concrete, concrete slats, expanded metal, and rubberized mat. The floor surface in stanchions and metabolism stalls may be concrete, expanded metal, wood, rubberized mat, or a combination of these.

FEED AND WATER

Feed and water should be presented to cattle in ways that minimize contamination by urine, feces, and other materials. Feedbunks should be monitored daily and contaminants removed. Some feed ordinarily should be available around-the-clock. Feed restriction longer than 24 hr should be avoided, and feed restriction longer than 48 hr should be justified in the care and use protocol, except that under range conditions, cattle may be fed supplement once or twice weekly.

Cattle may vary considerably in body weight during the course of grazing and reproductive cycles. Feeding programs should make it possible for animals to regain

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TABLE 5-1. Floor or Ground Area and Feeder Space Recommendations for Beef Cattle Used in Agricultural Research and Teaching.^{a,b,c}

Area or space	Calves (182 to 363 kg. 400 to 800 lb)		Finishing calves (363 to 545 kg. 800 to 1200 lb)		Bred heifers (363 kg, 800 lb)	
	(m ²)	(ft ²)	(m ²)	(ft ²)	(m ²)	(ft ²)
Floor or ground area						
Open lots						
Unpaved lots with mound (includes mound space)	14.0 to 28.0	(150 to 300)	18.6 to 46.5	(200 to 500)	23.3 to 46.5	(250 to 500)
Mound space	1.9 to 2.3	(20 to 25)	2.8 to 3.3	(30 to 35)	2.8 to 3.3	(30 to 35)
Unpaved lot, no mound	28.0 to 55.8	(300 to 600)	37.2 to 74.4	(400 to 800)	37.2 to 74.4	(400 to 800)
Paved lot	3.7 to 4.7	(40 to 50)	4.7 to 5.6	(50 to 60)	4.7 to 5.6	(50 to 60)
Barns						
Open front with lot	1.4 to 1.9	(15 to 20)	1.9 to 2.2	(20 to 25)	1.9 to 2.3	(20 to 25)
Enclosed, bedded pack	1.9 to 2.3	(20 to 25)	2.8 to 3.3	(30 to 35)	2.8 to 3.3	(30 to 35)
Enclosed, slotted floor	1.1 to 1.7	(12 to 18)	1.9 to 2.3	(20 to 25)	1.7 to 1.9	(18 to 20)
	(cm)	(in)	(cm)	(in)	(cm)	(in)
Feeder space if fed:						
Once daily	45.7 to 55.9	(18 to 22)	55.9 to 66.0	(22 to 26)	55.9 to 66.0	(22 to 26)
Twice daily	22.9 to 27.9	(9 to 11)	27.9 to 33.0	(11 to 13)	27.9 to 33.0	(11 to 13)
Free choice grain	7.6 to 10.2	(3 to 4)	10.2 to 15.2	(4 to 6)	10.2 to 15.2	(4 to 6)
Self-fed roughage	22.9 to 25.4	(9 to 10)	25.4 to 27.9	(10 to 11)	27.9 to 30.5	(11 to 12)
	Cows (454 kg, 1000 lb)		Cows (590 kg, 1300 lb)		Bulls (681 kg, 1500 lb)	
	(m ²)	(ft ²)	(m ²)	(ft ²)	(m ²)	(ft ²)
Floor or ground area						
Open lots						
Unpaved lots with mound (includes mound space)	20.5 to 51.5	(200 to 550)	20.5 to 46.5	(220 to 500)	46.5	(500)
Mound space	3.7 to 4.2	(40 to 45)	3.7 to 4.2	(40 to 45)	4.7 to 5.6	(50 to 60)
Unpaved lot, no mound	32.6 to 74.4	(350 to 800)	32.6 to 74.4	(350 to 800)	74.4	(800)
Paved lot	5.6 to 7.0	(60 to 75)	5.6 to 7.0	(60 to 75)	9.3 to 11.6	(100 to 125)
Barns						
Open front with lot	1.9 to 2.3	(20 to 25)	2.3 to 2.8	(25 to 30)	3.7	(40)
Enclosed, bedded pack	3.3 to 3.7	(35 to 40)	3.7 to 4.7	(40 to 50)	4.2 to 4.7	(45 to 50)
Enclosed, slotted floor	1.9 to 2.3	(20 to 25)	2.0 to 2.6	(22 to 28)	2.8	(30)
	(cm)	(in)	(cm)	(in)	(cm)	(in)
Feeder space if fed:						
Once daily	60.1 to 76.2	(24 to 30)	61.0 to 76.2	(24 to 30)	76.2 to 91.4	(30 to 36)
Twice daily	30.5 to 38.1	(12 to 15)	...	...	...	...
Free choice grain	12.7 to 15.2	(5 to 6)	12.7 to 15.2	(5 to 6)	...	...
Self-fed roughage	30.5 to 33.0	(12 to 13)	33.0 to 35.6	(13 to 14)	...	...

^a After MWPS (1987b).^b Values are on a per animal basis in a pen environment.^c In certain geographical areas (e.g., in dry climates), area accommodations may be less than indicated in this table.

the body weight lost during the normal periods of negative energy balance. Cattle should have continuous free access to a source of water except perhaps before scheduled surgery or weighing. When continuous access to water is not possible, water should be available for 30 min at least twice daily, or more frequently depending on weather conditions, amount of feed consumed, and production rate of the animals.

SOCIAL ENVIRONMENT

Cattle are social animals. Every individual should have sufficient access to the resources necessary for comfort, adequate well-being, and optimal performance. Mixing, crowding, group-member composition, and competition for limited resources are part of an animal's social environment and in some circumstances may be social stressors for certain individual cattle. Generally, cattle from

similar environments but from different social groups can be mixed with little or no long-term adverse effect, but the number of mixing episodes should be minimized. Mixing of older cattle, especially bulls, results in more fighting than occurs when younger cattle are mixed.

When feed, water, or other resources critical for comfort or survival are limited, or when there are large differences among cattle in size or other traits related to position in the social order, then some animals may be able to prevent others from gaining access to the resource. In properly designed facilities, all individuals should have unlimited access to feed, water, resting sites, and so on, and then the correlation between position in the social order and level of productive performance is low (Hafez, 1975; Stricklin and Kautz-Scanavy, 1984). Good husbandry includes observation of groups—and individuals within groups—to ensure that every individual has adequate access to the resources necessary for optimal comfort, well-being, and performance.

HUSBANDRY PROCEDURES

For beef cattle, several procedures may be performed by properly trained nonprofessional personnel. These include, but are not limited to, vaccination, dehorning and castrating young cattle, horn-tipping, ear-tagging, branding, weighing, implanting, use of hydraulic and manual chutes for restraint, roping, hoof-trimming, routine calving assistance, ultrasound pregnancy checking, and feeding and watering.

Other husbandry and health practices used in beef cattle research and teaching, but which require special technical training and advanced skill levels, include artificial insemination, electroejaculation, pregnancy palpation, embryo flushing and transfer, dystocia treatment, emergency Caesarean section, retained placenta treatment, and dehorning and castration of older cattle.

DYSTOCIA MANAGEMENT

Proper care and assistance at calving can reduce deaths of both calves and cows from dystocia. Matings should be planned genetically to lessen the probability of dystocia.

Parturition without complication is common in beef cows. Therefore, before administering assistance to a cow experiencing difficulty with calving, personnel should be familiar with the stages associated with approaching parturition and the signs of normal delivery. Cows that have complications must be assisted immediately.

Fetal extractors are necessary to assist in the delivery of some calves, but personnel who are to use a fetal extractor should either be trained and experienced or else supervised by someone who is.

CASTRATION

Bulls fight, mount, and ride their penmates more than do steers, and these behaviors can result in injury. Thus, castration of young bulls is a recommended practice.

Castration is least stressful when performed on calves a few days old. Calves older than 2 to 3 mo of age should be anesthetized locally during castration (see Farm Animal Welfare Council, 1981). Typically, in cow herds, one castration session may be scheduled at the end of the yearly calving period.

There are several accepted methods of castration for cattle, including surgical removal of the testicles using a knife or scalpel, and cutting or crushing the spermatic cords using an emasculator or emasculator. Castration procedures should be conducted by or under the supervision of a qualified, experienced person and carried out according to manufacturers' recommendations and accepted husbandry practices (Battaglia and Mayrose, 1981; Ensminger, 1983).

For seedstock cattle raised for possible use as replacement breeding stock, castration of low performance bulls (culled from the pool of those intended for use in breeding) is recommended around the time of weaning. Castration of older, heavier bulls should be performed only by skilled individuals. When it is necessary to castrate these heavier bulls, techniques and procedures to minimize pain and bleeding should be used and the possibility of infection should be given additional consideration.

DEHORNING

Horns on cattle can cause bruises and other injury to other animals, especially during transport and handling. Horns on adult cattle also can be a hazard to humans. Hornless cattle require less space in the feedlot and at the feedbunk.

Within the first few weeks after birth, horn buds can be removed by several means, including hot cauterizing iron, sharp knife, or commercially available mechanical devices. Dehorning (removal of horns) should be performed on cattle while they are young and under the supervision of experienced persons using proper husbandry techniques (Ensminger, 1970; Battaglia and Mayrose, 1981).

When it is necessary to remove horns from older cattle, methods that minimize pain, bleeding, and infection

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should be employed, and dehorning should be performed by a person knowledgeable and experienced in the appropriate procedures. In older cattle, dehorning should be performed under local anesthesia, and cattle should be monitored for hemorrhage and sepsis. Adult cattle should be dehorned only if the individuals are aggressive toward herdmates or humans. Dehorning may temporarily depress the growth of cattle (Loxton et al., 1982).

Tipping of horns (removing the tip only) can be done with little impact on the individual animal's well-being, but Ramsay et al. (1976) reported that, after transport, carcass bruises were as common among tipped cattle as among horned ones.

CATTLE HANDLING FACILITIES

A headgate or squeeze chute is important to restrain individual cattle. Sorting pens, crowding gates, and palpation chutes are also important facilities (Grandin, 1980a,b; 1983a,b). Proper resolution of emergency situations that involve illness or injury in cattle requires adequate handling facilities (see Chapter 2). Several hydraulic and manual models are commercially available, and there also are designs available for wooden headgates.

Well-designed chutes facilitate both loading and off-loading. Slopes of less than 20% work best, and properly designed steps can improve footing of the animals moving up and down the grade (Grandin, 1983a,b).

CHAPTER 6: GUIDELINES FOR DAIRY CATTLE HUSBANDRY

"Dairy cattle" are replacement heifer calves and yearlings, dry cows, lactating cows, and breeding bulls used in research and teaching related to milk production.

ENVIRONMENT AND FACILITIES

Criteria for a satisfactory environment for dairy cattle include thermal comfort (effective environmental temperature), physical comfort (injury-free space and contact surfaces), disease control (good ventilation and clean surroundings), and freedom from fear. Cattle can thrive in almost any region of the world that can yield the feed and water to support them, provided they are given ample shelter from excessive wind, solar radiation, and precipitation (Webster, 1983). They can alter their zone of thermoneutrality in response to cold and heat stress and can shift both its upper and lower limits by as much as 20°C (36°F) (Webster et al., 1970). Milk production declines as air temperature exceeds 24°C (75°F) or goes below -12°C (10°F) for Holstein and Brown Swiss cows (below -1°C [30°F] for Jerseys) (Yeck and Stewart, 1959) and depends on previous and current nutritional status (NRC, 1981, 1988a).

Although dairy cattle are highly adaptable and readily acclimate to various thermal environments and cycles, heat stress affects cattle comfort more than does cold stress. Milk production can be increased during hot weather by sunshades, sprinklers, misting, and other methods of cooling, as well as by dietary alterations. Temperatures consistently higher than body temperature can result in heat prostration of lactating cows, but additional energy intake (+1%/C°) and higher heat production compensate for lower temperatures even when it is so cold that frostbite occurs. Adaptation to cold by thicker haircoat and more subcutaneous fat also reduces cold stress.

The newborn dairy calf has a lower critical temperature of 8 to 10°C (50°F) (Webster et al., 1978), but the intake of high energy colostrum permits rapid adaptation to environmental temperatures as low as -23°C (-9°F) and as high as 35°C (95°F) in dry individual shelters with pens (Erb et al., 1951) or in hutches (Jorgenson et al., 1970).

Housing and handling systems vary widely, depending on the particular use of the animals in research and teaching (Albright, 1983, 1987). Early research showed an economic advantage to winter housing of dairy cows in-

stead of leaving them outside (Plumb, 1893). Many dairy farmers move their cows daily in good weather from indoor stalls into the barnyard, where they can groom (Wood, 1977).

Efforts to keep cows out of mud will increase their productivity and reduce endoparasitic and foot infections. Current trends favor keeping dairy animals on unpaved dirt lots in the Southwest and on concrete in the North throughout their productive lifetimes. Concrete floors need to be grooved or rough to provide good footing. Because there are limited data on long-term effects of intensive production systems, concern has been expressed about the comfort, well-being, behavior, reproduction, and udder, foot, and leg health of cattle kept continuously on concrete. As a safeguard, many cows are moved from concrete to dirt lots or pasture, at least during the dry period. Rate of detection and duration of estrus are higher for cows on dirt lots than for those on concrete (Britt et al., 1986).

Facilities for dairy cattle range from fenced pastures, corrals, and exercise yards with shelters to insulated and ventilated barns with special equipment to restrain, isolate, and treat the animals. Generally, corrals and sunshades are used in warm semi-arid regions, pastures and shelters are common in warm humid areas, naturally ventilated barns with free stalls are used widely in cool humid climatic regions, and insulated and ventilated barns with tie stalls are common in colder climates (American Society of Agricultural Engineers [ASAE], 1983).

Forced exercise during the dry period results in cows that are fit (Lamb et al., 1979) but may not affect milk yield. Forced exercise after parturition reduces energy intake and thus milk yield.

AREA

Between and within breeds, ages, and body conditions, critical dimensions of dairy cattle vary less with weight than with age. Body length and hip width are relatively uniform ($\pm <5\%$) across breeds at weights between 180 and 450 kg (400 and 1000 lb) (ASAE, 1987). More than 90% of the dairy cattle in the United States are Holsteins, so area recommendations for female calves and heifers are usually related to age groupings for Holsteins (Woelfel and Gibson, 1978; Graves and Heinrichs, 1984; MWPS,

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1985). Average normal growth curves relate heart girth and live weight to age (Woelfel and Gibson, 1978).

Body length, used to prescribe the length of individual stalls for many years (Goodman, 1926), is currently taken as the distance between the pin bones and the front of the shoulders (ASAE, 1987) or between the pin bones and the brisket (Irish and Merrill, 1986). A stall width to length ratio of .8 (Goodman, 1926) to .7 (MWPS, 1985) has been satisfactory for stanchions and tie stalls. Recommended width for free stalls is approximately twice the hip width (Irish and Merrill, 1986).

Dairy cows prefer larger, more comfortable stalls and use free stalls 9 to 14 hr daily (Schmisseur et al., 1966; Irish and Martin, 1983). A variety of features and range of effective dimensions for mature Holstein cows (Graves, 1977; ASAE, 1987) are in Tables 6-1 and 6-2.

BEDDING

Resting dairy cattle should have a dry bed. Where animals are housed, stalls ordinarily should have bedding

to allow for cow comfort and to insulate the udder against extremes in cold temperatures. When handled properly, many fibrous and granular bedding materials can be used. Bedding should be absorbent, free of toxic chemicals or residues that could injure animals or humans, and of a type not readily eaten by the animals. Bedding rate should be sufficient to keep the animals dry between additions or changes. Any permanent stall surfaces, including rubber mats, should be cushioned with dry bedding (Albright, 1983).

TIE STALLS AND STANCHIONS

When cows reside in tie stalls, the need for waste removal is greater and must be more regular and thorough than in free stall, corral, or pasture situations. Cow manure must be removed regularly and effectively from tie stalls to avoid contamination of the teat and reproductive tract orifices of cows. Mechanical waste removal along with regular scraping and disinfection are satisfactory.

TABLE 6-1. Recommended Options and Sizes^a for Pens and Stalls for Dairy Cattle Used in Agricultural Research and Teaching.

Components	Options		Sizes
Individual calves	Hutches and yard or tether	1.5 to 3 m ² /head	16 to 32 ft ² /head
Until 2 mo (to 200 lb)	Bedded pen	2.2 to 3 m ² /head	24 to 32 ft ² /head
Until 7 mo (to 400 lb)	Stall ^b	.6 to .8 X 1.5 to 1.8 m/head	10 to 15 ft ² /head
Groups ^c of weaned calves (< 400 lb, 3 to 12/group)	Movable shed (super calf hutch) plus yard	2 m ² /head	21 ft ² /head
	Inside pen	2.3 to 2.8 m ² /head	25 to 30 ft ² /head
	Bedded pack	3.1 X 4.9 to 6.1 m	10 X 16 to 20 ft
	Scraped alley	3.1 X 2.4 to 3.1 m	10 X 8 to 10 ft
Groups ^c of heifers in pens, 6 to 20/group 181 to 454 kg (400 to 1000 lb) 34 to 136 kg (75 to 300 lb)	With free stalls	(see Table 6-2)	
	With bedded pack	8 to 12 m ² /tonne	4 to 6 ft ² /cwt
		1.5 to 5.6 m ² /head	16 to 60 ft ² /head
		5 to 8 m ² /tonne	2.5 to 4 ft ² /cwt
	With slotted floor ^d	1.5 to 2.3 m ² /head	16 to 25 ft ² /head
	With counter slope		
	Floors and litter alley	6 to 8 m ² /tonne	3 to 4 ft ² /cwt
		1.5 to 3 m ² /head	16 to 30 ft ² /head
Dry cows and heifers (> 1000 lb)	Bedded pack and paved alley	8 to 12 m ² /tonne	4 to 6 ft ² /cwt
		4 to 9 m ² /head	40 to 96 ft ² /head
	With bedded nonslip floors	9.3 to 14.9 m ² /head	100 to 160 ft ² /head
		3.1 X 3.1 to 3.7 X 4.3 m	10 X 10 to 12 X 14 ft
Maternity or isolation pens (5% of cows)	Rugged pens	13 to 22.3 m ² /head	140 to 240 ft ² /head
	Tie stalls	3.1 X 4.3 m	10 X 14 ft or larger
Individual mature bulls		1.4 X 2.5 to 2.6 m	54 X 97 to 102 in
		to 1.8 X 360 m	to 72 X 188 in
Milking cows	Free stalls	(see Table 6-2)	
	Tie stalls	(see Table 6-2)	
	Paved lots	9 m ² /head	100 ft ² /head
	Unpaved corrals	23 to 46 m ² /head	250 to 500 ft ² /head

^aSizes exclude access for feeding and cleaning.

^bResearch protocol may require the use of individual stalls for calves.

^cDifferent sources use different age groups. Weight variation increases with age.

^dSpace decreases with age. Spacing between slots is 3.18 cm at 169 kg, 3.82 cm at 170 to 250 kg, and 4.45 cm at 250 to 500 kg (1.25 in at 374

lb, 1.5 in at 375 to 550 lb, and 1.75 in at 550 to 1100 lb) (Woelfel and Gibson, 1978).

TABLE 6-2. Recommended Sizes^a of Free Stalls and Tie Stalls as Related to Weights of Female Dairy Cattle Used in Agricultural Research and Teaching.

Target weight	Approximate age ^b	Free stall ^c	Tie stall ^c
	(mo)		
118 kg (260 lb)	4	61 X 122 cm (24 X 48 in) ^d	NI ^e
182 kg (400 lb)	6	69 X 122 cm (27 X 48 in)	NI
236 kg (520 lb)	8	76 X 137 to 152 cm (30 X 54 to 60 in)	NI
327 kg (720 lb)	12	86 to 91 X 152 to 168 cm (34 to 36 X 60 to 66 in)	NI
377 kg (830 lb)	16	91 to 107 X 168 to 198 cm (36 to 42 X 66 to 78 in)	NI
454 kg (1000 lb)	20	99 X 183 cm (39 X 72 in)	122 X 152 to 175 cm (48 X 60 to 69 in)
500 kg (1100 lb)	24	107 X 198 to 213 cm (42 X 78 to 84 in)	122 X 160 to 175 cm (48 X 63 to 69 in)
545 kg (1200 lb)	26	114 X 208 to 213 cm (45 X 82 to 84 in)	122 X 168 to 175 cm (48 X 66 to 69 in)
636 kg (1400 lb)	48	122 X 213 to 218 cm (48 X 84 to 86 in)	137 X 183 cm (54 X 72 in)
727 kg (1600 lb)	60	122 X 229 cm (48 X 90 in)	152 X 183 to 198 cm (60 X 72 to 78 in)

^aSizes are generally higher from Midwest sources than Northeast sources.^bAge of Holstein or Brown Swiss for target weights.^cMeasurements are given as stall width times stall length.^dFree stalls not recommended below 4 (Graves and Heinrichs, 1984) or 5 mo of age (Woelfel and Gibson, 1978; MWPS, 1985).^eNI = Not included in recommendations for dairy heifers (Woelfel and Gibson, 1978; Graves and Heinrichs, 1984; MWPS, 1985; Heinrichs and Hargrove, 1987).

Cow trainers and gutter grates are recommended for cleaner stalls and cows.

FREE STALLS

Key features of most free stall accommodations are leveled dirt base, clean bedding, and regular and effective cleaning of alleys. When dangerous pathogens or toxic or noxious substances are identified in the environment, they should be removed, the area cleaned and disinfected, and new, noncontaminated material supplied. Good management procedures include the removal and replacement of contaminated bedding or soil and the disinfection of such areas with agents effective against the specific pathogen(s) present.

CORRALS

Corrals should be scraped regularly and concrete alleys scraped and flushed regularly to clean them effectively. Feedbunk areas should be scraped regularly and any leftover feed removed. Sheds and corrals should be designed to minimize areas of moisture and mud.

PASTURE

Pasture management and watering facilities have been implicated in a number of significant bovine diseases and zoonoses. Pasture should be managed to avoid disease transmission.

Stocking rates should be managed to maximize production per head unless forage supplementation is provided or there is a particular desire to study production per unit of pasture area only. This strategy will minimize the stress that may result from overgrazing and minimize ingestion of plants in immediately surrounding areas contaminated with excreta, thereby reducing the challenge of potential pathogens and helminth parasites. Some pathogenic microbes may survive more than 6 mo in fecal deposits.

FEED AND WATER

Except as necessary for a particular research or teaching protocol, dairy cattle should be fed diets formulated to meet their needs for maintenance, growth, production, and reproduction (see Chapter 2). Feed ingredients and

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finished feed should be wholesome, carefully mixed, and stored and delivered to the animals to minimize contamination or spoilage of feeds. Feeds not consumed should be removed daily from feeders and mangers to ensure freshness of feed. This is especially important with high moisture feeds such as silage. Feed should be far enough from waterers to minimize contamination.

All calves should consume colostrum in amounts of at least 5% of body weight as soon as possible after birth and a similar amount later during the first day (Stott et al., 1979; Stott and Fellah, 1983). Until they are consuming dry feed at an adequate rate, calves should be fed liquid feed in amounts sufficient to provide needed nutrients. Calves raised as replacement heifers or for beef should be fed enough dry feed with sufficient fiber pre-weaning to stimulate normal rumen development (McGavin and Morrill, 1976). Calf research guidelines to obtain uniformity in measuring and reporting experimental data have been reported (Larson et al., 1977).

Water should be given at times other than when milk or milk replacer is fed to avoid possible interference with curd formation. Water intake affects consumption of dry matter (Kertz et al., 1984; Milam et al., 1986) and is also influenced by individual behavior, breed, production rate, type and amount of feed consumed, water temperature, environmental temperature, atmospheric vapor pressure, water quality, and physical facility arrangement (Atkeson and Warren, 1934; Murphy et al., 1983; Andersson, 1985; Lanham et al., 1986). Nonlactating cows consume 3 to 15 kg of water/kg dry matter consumed, depending on environmental temperature. Lactating cows consume 2 to 3 kg of water/kg milk produced plus that required for maintenance (Little and Shaw, 1978).

Water should be monitored daily and be free of harmful contaminants, especially human sewage, which can potentially put zoonotic agents into the human food chain (Johnston et al., 1986).

Water sources should be readily accessible to all stock. Underfoot surroundings in watering areas should be dry and firm. Cattle should not be able to wade in drinking water.

When continuous access to water is not possible, water should be available for 30 min at least twice daily, or more frequently depending on weather conditions, amount of feed consumed, and production rate of the animal.

NOISE

Changes observed in cows exposed to noise were well within the range of activity variation expected in a group

of cows (Casaday and Lehmann, 1967). However, disturbances by veterinarians and other visitors can reduce milk yield (King, 1976). Experimental results suggest that music in the environment of cows (Whittlestone, 1960; Albright, 1981; Evans, 1984; Fox, 1984; Hart, 1985) can contribute to consistency in the environment and can become part of a cluster of stimuli that conditions the milk-ejection reflex.

SOCIAL ENVIRONMENT

Dairy cattle are social animals that operate within a herd structure and follow a leader to and from pasture, milking parlor, etc. Cows exhibit wide differences in temperament, and their behavior is determined by inheritance, physiology, prior experience, and training. Cows are normally quiet and thrive on gentle treatment by handlers. Handling procedures are more stressful for isolated animals; therefore, attempts should be made to have several cows together during medical treatment, artificial insemination, or moving from one group to another (Whittlestone et al., 1970; Arave et al., 1974).

HUSBANDRY PROCEDURES

Certain dairy cattle behaviors (e.g., aggression and kicking) put at risk the health and well-being of herdmates as well as the humans handling the cattle. Several devices and procedures can reduce or modify these behaviors. Certain identification procedures (see Chapter 2; Moeller, 1981), supernumerary teat removal, and milking must be performed properly to minimize negative effects on cattle health.

Castration may be performed on male calves (see Chapter 5) except those being raised as veal calves (see Chapter 11) or kept as dairy bulls. Dehorning should be performed as described in Chapter 5. Older calves and heifers close to calving should have supernumerary teats removed under local anesthesia by a qualified person. The removal of these extra teats is necessary because they have the potential to disrupt the milking process later and to become infected. Removal may be performed in the first 3 months of life with a scalpel or sharp scissors. Electroejaculation should be performed by or under the supervision of a qualified person.

FOOT CARE

In situations having the potential for outbreak of infectious necrobacillosis of the hoof or other foot infections, antiseptic footbaths are recommended (Blood et al., 1983). Properly maintained footbaths should be placed

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in areas of heavy traffic flow (e.g., exits from the milking area). Predisposing causes of foot problems (e.g., sharp rocks or moist or muddy ground) should be removed.

**MILKING MACHINE
AND UDDER SANITATION**

The facility should have a program of regular maintenance of milking machines and follow the National Mastitis Council's comprehensive mastitis prevention and milking management program. As dairy cows may be studied and maintained in a variety of environments, various strategies of disinfection and sanitation are required. Appropriate equipment and competent personnel should be available for the milking of cows. Animal care facilities should be designed and operated to standards meeting or exceeding those of grade A dairies (Pasteurized Milk Ordinance, 1985). Cows may be milked with portable milking equipment maintained to grade A standards of efficiency and sanitation. Particular care should be taken not to undermilk or overmilk cows and to be attentive to a milking schedule (usually twice daily at regular intervals). Personnel trained or experienced in the husbandry and milking of dairy cows should be employed for this task.

Milking machine and udder sanitation are vital to an effective preventive program against mastitis. Water used to wash cows before milking should be of a high quality, as the presence of microbes in wash water has been implicated in mastitis outbreaks (Malmo et al., 1972). Udders, especially teat ends, should be clean and dry when teat cups are applied for milking. Premilking washing of teats with disinfectant solution is controversial because of the potential for contamination of milk and little discernible impact on the rate of new mastitis infections (Sheldrake and Hoare, 1983). Postmilking disinfection of teats is an essential management practice that greatly reduces the incidence of mastitis (Neave et al., 1969; Philpot et al., 1978a,b; Philpot and Pankey, 1978). Milkers handling cows should pay meticulous attention to hygiene and thoroughly wash hands before milking or wear clean gloves during milking to prevent contamination of the udder.

Effective cleaning programs for milking machines include use of hot water; use of disinfectant solutions and other chemical agents effective for removing mineral, milk fat, and protein deposits from equipment between milkings; disinfection of teat cups between cows; and flushing of teat cups with warm water, cold water, boiling water, or chemical disinfectant solution.

CHAPTER 7: GUIDELINES FOR HORSE HUSBANDRY

Guidelines in this chapter apply generally to all domestic equids. Accommodation dimensions and area recommendations should be downsized appropriately for ponies.

INDOOR ENVIRONMENT

Indoors, area should be sufficient for a horse to make normal postural adjustments at will. A reasonable area allowance for single horses is twice the square of the animal's height at the withers (Zeeb, 1981), which permits the animal essential movements, including lying down in sternal or lateral recumbency. Although horses can engage in slow wave sleep while standing, rapid-eye-movement sleep occurs only when the horse is recumbent (Dallaire and Ruckebusch, 1974; Ruckebusch, 1975).

Box stalls should be large enough to permit the horse to get up, turn around, and not lie in, stand on, or eat from areas contaminated with its own feces or urine (Table 7-1). The recommended minimum area for straight or tie stalls (including space for the manger) is shown in Table 7-1.

Stall doors may be sliding, hinged, or divided (Dutch). Doors should either be solid or made of material in which the horse cannot become entangled. Doors should be large enough to permit the horse to enter and leave its stall comfortably but should not block adjacent alleys when ajar.

Suitable flooring materials for indoor stalls include rubber mat, artificial turf, packed clay, asphalt, concrete, sand, and wood. Floors should be selected for ease of cleaning and for sanitation, comfort, and safety of the horse. Slippery floors can lead to injuries, and hard surfaces can cause lameness. Concrete floors with a rough "broom float" surface that slope to a floor drain or exterior door are suggested for wash areas, alleys, and feed and equipment storage areas.

Solid walls are suggested for foaling stalls to prevent aggression by the postpartum mare toward horses in adjacent stalls (aggression that may be redirected toward her own foal).

An opening 2.5 cm (1 in) wide and 75 cm (30 in) above the floor in walls and partitions aids stall ventilation and can be closed with a removable filler strip. Open guards 1.4 to 1.5 m (4.5 to 5 ft) above the floor between

box stalls can be made of 1.3-cm (.5-in) steel rods, 1.9-cm (.75-in) pipe spaced not over 10 cm (4 in) apart on centers, No. 4 gauge welded-steel fencing, flattened expanded 9-gauge metal, No. 9 chain-link fencing, vertical hardwood slats, or comparable material.

Ceilings, when present, should be made of a moisture-proof material and preferably smooth with a minimum of exposed pipes and fixtures. Minimum ceiling height should be at least .3 m (1 ft) higher than the horse's ears. Commonly used ceiling heights are 2.4 to 3.1 m (8 to 10 ft) for stall areas and 4.3 to 4.9 m (14 to 16 ft) for riding areas.

Windows or unglazed openings are recommended but not essential if adequate lighting and ventilation are supplied by other means. A minimum of windows should be used in cold climates. A tip-in or removable 61 × 61-cm (2 × 2-ft) window in each box stall aids lighting and warm weather ventilation. The bottom of breakable barn windows should be 1.5 m (5 ft) or more above the floor and protected to prevent breakage. Glass windows that can be opened are preferable to fixed translucent panels installed as part of the wall sheathing because such panels are difficult to maintain.

An alley should be provided between rows of stalls to allow room for horses to pass, for feed and bedding to be handled, and for manure to be loaded; behind a single row of stalls and in front of a row of stalls an alley will allow for feeding, moving horses, and allowing people to pass. Alleys in horse barns should be wide enough for the horse to turn around, or if narrower, should have exits to the outside at both ends. Alley doors to the outside may be overhead, swinging, or sliding and should be sized appropriately to the alleyway. Divided (Dutch) doors allow the horse to have, in effect, a larger stall when it puts its head out, yet permits visual isolation of the horse when so desired. A wider alley is suggested where Dutch doors permit horses to have their heads in the alley.

Bedding. Type of bedding should be consistent with the horse's comfort and with proper sanitation. Acceptable beddings include straw, wood shavings, sawdust, paper, pine needles, and sand. Horses fed a pelleted diet should not have sand bedding because they tend to ingest the sand and suffer from intestinal impaction. Bedding

TABLE 7-1. Recommended Dimensions of Housing and Transportation Accommodations for Horses and Ponies Used in Agricultural Research and Teaching.

Indoor facilities		
Box stall, 1.8 m ² /100 kg BW ^b (9 ft ² /100 lb BW)	3.7 to 3.7 m ^a	12 x 12 ft
Straight or tie stall, including manger, .82 m ² /100 kg BW (4 ft ² /100 lb)	1.5 x 2.7 m ^c	5 x 9 ft
Alleys, width		
Between rows of stalls	2.4 to 3.1 m	8 to 10 ft
Behind rows of stalls	1.8 m	6 ft
In front of single row of stalls	1.2 m	4 ft
Outdoor facilities		
Fencing height for		
Horses	1.4 to 1.8 m	4.5 to 6.0 ft
Ponies	1.1 to 1.5 m	3.5 to 5.0 ft
Outdoor pen	3.7 x 3.7 m ^c	12 x 12 ft
Pasture	.04 hectare or more	.1 acre or more
Trailers		
Ceiling for horse height		
Up to 1.5 m (15 hands)	1.7 to 1.8 m	5.6 to 5.9 ft
1.5 to 1.6 m (15 to 16 hands)	2 to 2.1 m	6.6 to 6.9 ft
Width		
Single or tandem	1.2 m	4 ft
Two horses abreast	1.7 to 2 m x 1.8 to 3.1 m	5.6 to 6.6 ft x 5.9 to 10.2 ft

^aFor a riding horse weighing 360 to 520 kg (800 to 1150 lb), a satisfactory box stall is 3 x 3 m (10 x 10 ft); however, the 3.7-m² (12-ft²) size is more common.

^bBW = Body weight.

^cLengths up to 3.7 m (12 ft) are used; length is measured from the manger front to the rear of the stall.

should be free of toxic chemicals or other substances that would injure horses or people. Black walnut shavings cause founder in horses (Ralston and Rich, 1983), and cocoa husks have also caused illness. Rubber mats alone may be used when the experimental or instructional protocol does not permit traditional bedding. Otherwise, rubber mats should be used only with bedding.

Temperature and Ventilation. The thermal comfort zone of an adult horse ranges from 7 to 29°C (45 to 85°F) (Ensminger, 1969). The horse acclimatizes to subzero air temperatures but needs wind protection. Newborn foals need more protection because of their relatively high lower critical temperature. Relative humidity in horse quarters should be 50 to 80%.

Ventilation air changes must be proportional to environmental temperature, atmospheric vapor pressure, total weight of horses, and animal and other heat and water vapor production in the barn. Ventilation rate capacity should be at least .7 to 2.8 m³/min per 450 kg (25 to 100 ft³/min per 1000 lb) of horse; the lower rate is for -18 to -7°C (0 to 20°F) and the higher rate for -1 to 10°C (30 to 50°F) temperatures (MWPS, 1987a). Addi-

tional ventilation capacity, plus air circulation, is needed in hot weather. Supplemental make-up heat may be needed with cold weather ventilation, and insulation is recommended for "warm housing". Flat ceilings aid air distribution and reduce heating needs for mechanical ventilation in warm barns.

Lighting. Lighting should permit inspection of the horses and condition of bedding. Illumination of at least 200 lx (18 ft-c) is recommended for alleys, handling, and feeding areas (Currence and McFate, 1984). One 100-W incandescent lamp (approximately 1600 lumens) per 8 m² (90 ft²) of floor or for each box stall is adequate to produce 200 lx (18 ft-c) illumination intensity (MWPS, 1987a). Total darkness in a horse barn should be avoided; windows or another light source should be present at night. Luminaires and lamps or tubes should be recessed or otherwise protected against damage by the animals.

Sanitation and Waste Disposal. Stalls should be cleaned as needed, usually daily, to keep horses clean and dry and the environment suitably free of dust and odors. Gutters, drains in the alley, or some other means for drainage of urine and spilled water should be provided.

GUIDELINES FOR HORSE HUSBANDRY

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Gases emitted during storage, handling, and treatment of manure should be assessed. A 450-kg (1000-lb) horse produces about 20 kg (45 lb) of manure per day, plus spilled water, bedding, and other waste. Although manure as deposited is composed of about 80% water, it is relatively dry to handle (MWPS, 1987a).

Horses should not have access to manure storage areas because of the danger that they might acquire gastrointestinal parasites. Manure should be spread and incorporated into cropland or composted before being spread directly on pasture to be grazed by horses. Refuse should be disposed of in an appropriate landfill. Horses groom themselves by rolling in dirt, rubbing against stationary objects, and engaging in mutual grooming with another horse. Horses confined to tie or metabolism stalls should be groomed by animal care personnel at least once a week or more frequently if shedding. Hooves should be cleaned and trimmed as necessary to prevent lameness and infection.

Exercise. With proper husbandry, horses can be kept in an indoor stall for several months at a time, but those standing for prolonged periods in either box or tie stalls may develop edema of the lower limbs ("stocking up"). Healthy horses in box stalls should be removed from their stalls and exercised daily, if possible, or for a total of 1 hr of free time or 15 min of controlled exercise per day. More time for exercise should be provided if the animals are confined to tie stalls.

OUTDOOR ENVIRONMENT

Pastures, Paddocks, and Corrals. In general, horse pastures, paddocks, and corrals should provide a reasonably comfortable environment including sunshade, windbreak, and firm soil upon which to rest; sufficient area for normal postural adjustments and an appropriate resting place; and an enclosure that confines the horses safely and is free of trash, holes, and other dangerous objects, but that avoids unnecessary physical restraint. These outdoor accommodations also should provide for the biological needs of the animal (e.g., feed and water, effective environmental temperature in or near the thermoneutral zone, reproduction if appropriate, and freedom to avoid contact with excreta).

A horse's requirement for space in paddock and corral areas may vary considerably depending on environmental situations (e.g., soil type, climate, forage availability, and drainage), size and type of animals (ponies, light horses, or draft horses), and, in certain cases, temperament of the individuals in a group. The minimum area for an individual in an outdoor pen is the same as that

for a box stall, but a larger area is suggested so that the animal can exercise, roll, and avoid groupmates. In wet, muddy conditions, area allowance should be increased to minimize churning and high areas should be provided for the animals to lie down. A maintenance area of 45 m² (500 ft²) is suggested with an earthen mound 1.5 to 2 m (5 to 6 ft) high and 18 to 21 m (60 to 70 ft) long for 50 horses (maximum) per pen.

In temperate climates, horses may often be confined to paddocks or pastures without shelter other than that provided by terrain, trees, wind fences, or sunshades. Even in very hot and very cold environments, horses may use shelters seldom or not at all. A separate feed/creep area should be provided for foals (see under Feed). Depending on age, weight, feeding level, acclimatization status, and husbandry system, no additional shelter may be necessary. Still, in certain cases, bedding may be required to enable the horse to keep warm and dry. It has been suggested that sunshades or access to a ventilated stable needs to be provided in areas where summer temperatures reach 29°C (85°F) or higher; however, in many areas, horses thrive without these.

Three-sided or run-in sheds are suitable shelters (see Table 7-1). The minimum shelter area per horse is two to three times the minimum straight stall dimension. Drainage systems should direct water away from areas of heavy use (e.g., near feeders, watering troughs, run-in sheds, and shades).

Fencing and Gates. Guides to fencing dimensions and materials are available from the MWPS (1986), Ensminger (1969), and other sources. Fencing may be made of various materials, including wooden posts and rails, solid boards, wire, metal pipe, plastic, rubber, and V-mesh or chain-link fencing. It is not necessary to paint or seal fences, except when the protocol requires it. Barbed wire fencing may be acceptable in large pastures (i.e., in excess of .8 ha [2 acres] per horse), but barbed wire should not be used in smaller paddocks, narrow lanes, or alleys. Obviously, fences should be constructed to avoid features injurious to horses, such as sharp, protruding objects (e.g., nails, wires, bolts, and latches), and if possible they also should avoid narrow corners (e.g., less than a 45° angle) in which a horse can be trapped by a groupmate and kicked, bitten, or otherwise injured.

Fence heights for horses are given in Table 7-1. The bottom of fences and gates should be at least 15 cm (6 in) above ground or extend all the way to the ground to prevent the horse from catching a leg under it, especially when rolling.

Electric fencing may be used for horses under certain conditions. Electric fence controllers should have been approved by Underwriters Laboratories or other accepted testing organizations. A single wire used for fencing should be set .8 to 1 m (30 to 40 in) above the ground, depending on the size of the animal (Ensminger, 1969). Strips of white or colored textile material or metal should be attached to the single strand of wire to improve visibility. An alternative to electric wire is highly visible conductive plastic tape.

Gates may be constructed of several different materials, including wooden boards, pipe, sheet metal, and wire. Height of the gate should be similar to that of the fence adjoining it to discourage animals from attempting to jump over the lower point. Width of the gate should not leave a space in which an animal may become caught and injured. The bottom of gates, like the bottom of fences, should either extend all the way to the ground or be 15 cm (6 in) or more above the ground.

FEED

Feed containers may be constructed of metal, plastic, rubber, concrete, wood, or any other material that is safe, sturdy, and can be cleaned thoroughly. Hay may be fed from mangers, nets, racks, or fed on the floor. The horse appears to prefer eating from the floor (Sweeting et al., 1985), and in a properly cleaned stall there is relatively little danger of parasite transmission.

Hay racks should be free of sharp edges and corners. The usual distance between the ground and bottom of the rack is .9 to 1.2 m (3 to 4 ft) when outdoors. Grain may be fed in buckets, in the lower part of many hay racks, or from separate troughs or boxes. Feed containers should permit the horse to insert its muzzle easily. A 30-cm (12-in) diameter is commonly used. Examples of acceptable dimensions of hay mangers and boxes have been published (MWPS, 1986), but these do not represent minimum dimensions. It is important to monitor feed containers daily to be sure that they are clean, free of moldy or wet feed, and not broken or damaged. Pastures should be inspected routinely for growth of unusual or poisonous plants (Kingsbury, 1964; Oehme, 1986), especially when pastures are overgrazed.

For horses confined inside or in areas where they cannot graze, roughage in the form of hay or other fibrous feedstuffs should be provided to reduce the incidence of stable vices (e.g., cribbing, wood-chewing, tail-chewing, or ingestion of bedding) and more closely approximate their natural diet.

Nutrient requirements of horses on pasture may be provided from forages available in the pasture or by a combination of pasture forage plus supplemental feeding of roughage and grain. During certain periods of the year, growth of forages may be greatly reduced, thus necessitating supplemental feeding. Also, it is important to consider the effect of the environment on energy requirements, which increase significantly during periods of cold, wet weather (NRC, 1981). At other times, depending on stocking rate, little if any supplemental feeding may be required.

If horses are expected to meet their nutrient needs solely from pasture, care must be taken to ensure that the pasture can indeed support their requirements. Pasture stocking density varies from .4 to 4 ha (1 to 10 acres) or even more per horse, depending on the type, concentration, and growth stage of the forage and the season (Hintz, 1983).

If supplemental feeding is required in pasture situations, fenceline mangers, buckets, or boxes may be used to allow feeding from the adjoining road. Multiple sites (buckets or boxes) are preferable to a single site to decrease the risk of injury during aggressive competition over feed.

Freestanding hay racks also may be used for groups of horses. These may be placed away from the fence or adjacent and perpendicular to the fence, thus allowing them to be filled from the other side of the fence. Drainage away from the feeder should be provided to minimize mud during rainy weather. When horses in paddocks or corrals are fed from the ground, potential for parasite transmission is greatly increased due to fecal contamination of the feed.

Creep feeders may be used for foals. These may consist of an enclosure too small for adult horses to enter, but large enough for foals to enter, located in the pasture (usually near the hay manger). Creep feeders, like other feeders, should be clean, free of sharp protrusions, and in good repair, and the feed should be kept fresh.

Feeding space for horses has not been well-defined, and it may vary considerably depending on the size, number, and temperament of the individuals that must eat from the same feeder simultaneously. Sufficient bunk space or feeding points should be provided to preclude excessive competition for feed. An extra feeding point (one more than the number of horses) will reduce aggression toward and stress upon the lower ranking horses in the dominance hierarchy. This is particularly important if the feed ration is restricted.

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WATER

If a natural water source is used, care must be taken to assure that flow rate is sufficient in dry weather, that water is not frozen in cold weather, and that supplementary water sources are provided if necessary. Watering devices used in pastures or corrals should be durable and require little maintenance. The water source should be clean and safe; NRC (1974) recommendations for livestock water quality may be used as a guide in determining suitability for use.

Water should be continuously available or made available at least twice daily. The requirement for water depends on several factors, such as environmental temperature, animal function, and diet composition. In general, however, a horse needs 2 to 4 L (2 to 4 qt) of water per kg (2.2 lb) of dry matter intake (NRC, 1978). A horse fed to maintenance in a thermoneutral environment may need 15 to 35 L (4 to 8 gal) per day, whereas a horse that is working and sweating may need 50 to 80 L (12 to 18 gal) daily.

Waterers may vary from simple buckets to troughs or automatic drinking devices. Waterers should be free of sharp edges. Automatic waterers must be functional, clean, and able to be operated by the horses. Waterers should be inspected daily (more often in hot weather) to be certain they are operating properly and are free of foreign material. Water troughs should be cleaned as needed to prevent algae or dirt from accumulating. Water should be heated to prevent freezing in cold weather and be inspected daily to ensure they are free of ice. Proper installation of heating devices is necessary to prevent electrical shock. A float or stick may be placed in a trough to allow birds and other animals that fall into the trough to escape. Waterers should be positioned in a manner to prevent horses from injuring one another.

NOISE

Horses are sometimes disturbed by sudden noises, and background white noise or music is often used to mask or habituate the animals to unexpected sounds that might otherwise startle horses. Noise control should be considered in facility design for the benefit of the animals and personnel.

SOCIAL ENVIRONMENT

Horses are herd animals. The average feral herd contains five to seven adult mares, a stallion, foals, and juvenile offspring (Waring, 1983; Berger, 1986). When possible, horses should be kept in groups (which may be considerably larger than the feral norm) to reduce the incidence of vices and eliminate injuries incurred when

an isolated horse tries to join others. Although horses in most groups are compatible with one another if sufficient space is provided, observation is necessary to detect situations in which one or more horses are being injured or deprived of feed because of aggressive behavior. Frightening or startling stimuli (e.g., strange moving objects or loud noises) should be minimized to prevent fright and injury of a horse. Mares and geldings may be housed together, but some geldings—despite complete castration—continue to behave like stallions (Line et al., 1985) and may fight with other geldings or injure foals during the breeding season. No more than one stallion should be kept with a group of mares.

Care should be taken to prevent horses from becoming injured when they are first introduced to each other or when they are crowded. Introduction should take place in daylight, when the horses can see the fences and when the caretaker can observe the horses. A horse is most likely to be injured when it cannot escape from an aggressor.

TRANSPORTATION

The typical vehicle used to transport horses accommodates from one to several horses that may or may not be tied. During transportation, attempts should be made to minimize the horses' trauma and anxiety. This includes loading, manner of driving, interior space, footing, ventilation, and possibly interior padding.

Trailers. Trailers deteriorate with use and exposure. Floorboards should have a framework of sufficient strength to bear twice the weight of any animal to be transported. Floor planking and metal floor braces and door latches should be inspected before every trip.

The required dimensions of a trailer depend on the size of the horses being hauled (Table 7-1). Stock trailers with or without enclosed fronts or roofs may be used. Stall-type horse trailers should have a butt chain or bar. The rear doors may either be hinged (horse steps up into trailer) or have loading ramp doors, or both, with a strong fastening bar on the door to prevent rear doors from opening during transit. If a partition is used, it should be 1.25 to 1.5 m (4 to 5 ft) high and should extend to within .3 m (1 ft) of the floor. If a partial partition is used, legs should be protected with wraps or bandages. However, in trailers narrower than 1.7 m (5.6 ft), a partition or bar prevents a horse from spreading its legs enough to achieve proper balance, and so should not be used. Flooring should not be slippery. Sand, bedding, or a nonslippery mat should be used to provide better footing and thus reduce anxiety and injury.

Regulation of air movement through the trailer is essential to avoid thermal stress or excess exposure to exhaust fumes. Adequate ventilation is especially crucial during extremely hot or cold weather.

Lighting in the trailer facilitates animal handling at night. Because horses normally are not tied during transit, they can be accommodated with less area per horse. Care must be taken to avoid injuring horses when transporting mixed sexes or sizes.

Horses may need to be fed and watered during a trip. They should not be expected to travel more than 18 hr at one time in a one- or two-horse trailer without a break (Cregier, 1982a,b). Removal of horses after this period to allow them to move about will help prevent colic, founder, and lower leg edema. Leg wraps, tail wraps, bell boots, or tranquilizers are not necessarily required, but they may be beneficial for some horses during transit.

RESTRAINT AND ANESTHESIA

General guidelines for restraint of animals are in Chapter 2. Horses can be minimally restrained with halters and bridles, and extra control can be gained by the chain of a lead shank over the horse's nose. A horse can be restrained by lifting one of its forelegs. As a form of

restraint, a twitch may be used on the horse's upper lip. Horses also can be restrained by cross ties, but these should have safety releases, especially if the procedure to be performed is painful or the horse is unaccustomed to restraint. Slip knot lassos should not be used to restrain horses.

Horses can be restrained in stocks and chutes. A stock may be as simple as a single L-shaped pole or it may have solid doors in front and back. A strap across the horse's back will prevent it from rearing or jumping out of the stock. Chutes either should have solid sides or else the sides should end .15 to .2 m (6 to 8 in) above the ground. The chute should be able to be opened from either side in case the horse falls or injures itself.

When administered by a qualified person, chemical restraint is effective, but care should be taken, because an apparently sedated horse may react suddenly and forcefully to painful stimuli. General or local anesthesia should be used for castration and other painful procedures.

General guidelines for metabolism stalls are in Chapter 2. If possible, horses should be removed from the stalls daily for short periods of exercise to minimize edema of the lower limbs.

All horses should be vaccinated against tetanus.

CHAPTER 8: GUIDELINES FOR POULTRY HUSBANDRY

The husbandry guidelines in this chapter are for the three major poultry species in the United States: chickens (both egg-type and meat-type), turkeys, and ducks.

POULTRY FACILITIES

The physical environment afforded by a poultry facility should not put birds at undue risk of injury or expose them to conditions likely to cause unnecessary distress or disease (Davis and Dean, 1968; North, 1984; Berg and Halverson, 1985; Tauson, 1986). The facility should prevent bird escape and entrapment, maintain air quality by ventilation, allow the birds to keep themselves clean, minimize extremes of environmental temperature consistent with the housing system (less control is possible with open-type houses), avoid unnecessary accumulation of waste, and protect birds from unusual deleterious environmental factors (e.g., predators).

Design of the housing system should facilitate cleaning and inspection of the birds without handling them, yet the birds should be easily accessible. Feeding and watering equipment also should be accessible for easy maintenance.

SOCIAL ENVIRONMENT

Certain common social environments are particularly stressful to poultry and should be avoided.

Chickens. Excessive fighting and sexual abuse of individuals showing extremely submissive behavior may occur in relatively large groups of mature males residing in floor pens. The proportion of mature males in sexually mature flocks should be low enough to avoid injury to females from excessive mounting. The optimal ratio in most breeder flocks is 1 male to 12 to 15 females for egg-type strains and 9 to 11 females for meat-type chickens.

When group size increases to 12 or more in relatively high density hen cages, adult hen "hysteria" may occur in some genetic stocks; moreover, productivity declines and feather loss may be excessive (Hansen, 1976; Craig and Adams, 1984). Repeated movement of individuals from one socially organized flock to another tends to

induce stress in those individuals that are moved (Gross and Siegel, 1985). Human interaction with chickens can also contribute, either favorably or unfavorably, to the social environment of the animal (Gross and Siegel, 1982).

Turkeys. Turkeys are likely to panic when sudden changes occur in their environment (e.g., a wild bird flying through the house, loud noises to which the birds are not habituated), and then they may trample each other and "pile up" against barriers or in corners with resulting injury and mortality. Therefore, such sudden changes should be prevented to the extent possible. Alternatively, young pouls, which are less susceptible to such stimuli, may be habituated to conditions likely to be encountered later in life that would then cause hysterical responses. Tom turkeys are prone to engage in excessive aggressive behavior as they become older. Early beak-trimming reduces the likelihood of injuries from fighting among toms.

Ducks. Ducks react in a manner similar to chickens when they are kept in stressful social environments. Sexually mature drakes kept together in groups of more than five or so tend to engage in excessive fighting and sexual abuse. The ratio of males to females in a sexually mature flock should not exceed 1:5 appreciably to prevent injury to females from excessive mounting.

AREA AND FEEDER RECOMMENDATIONS

Use of floor area by individual birds within groups follows a diurnal pattern and is influenced by the dimensions and other aspects of the accommodation. Birds may huddle together for shared warmth or spread out for heat dissipation. They generally use less area when resting and grooming than during more active periods. When substantial competition for feed occurs because of limited feeder space, inhibition of feeding in subordinate birds is likely (Cunningham and van Tienhoven, 1984).

Poultry are of diverse types and all may be kept humanely and successfully in a wide variety of housing and management systems. Recommendations for minimum floor area and feeder space for multiple bird pens and cages (Table 8-1) are based on either experimental evidence or opinions of recognized authorities on sound husbandry. Generally, the area allowance is

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TABLE 8-1. Minimum Floor Area and Feeder Space for Chickens, Turkeys, and Ducks in Multiple-Bird Pens and Cages Recommended for Use in Agricultural Research and Teaching.

Species, type, and developmental stage	Type of housing and floor	Floor area/bird		Feeder space/bird ^a		
		(cm ²)	(in ²)	(cm)	(in)	
Chickens						
Laying and breeding						
Brooding (0 to 6 wk)						
Mini-Leghorn pullets	Litter	464	72	2.5	1.0	
Leghorn-type pullets	Litter	464	72	2.5	1.0	
Medium-size pullets	Litter	742	115	3.0	1.2	
Meat-type pullets	Litter	742	115	7.6	3.0	
Leghorn cockerels	Litter	697	108	3.8	1.5	
Medium-size cockerels	Litter	1116	173	4.6	1.8	
Medium-size mixed sex (to 8 wk)	Litter	929	144	9.7	3.8	
Meat-type cockerels	Litter	1116	173	11.4	4.5	
Growing (>6 wk)						
Mini-Leghorn pullets	Litter	742	115	5.1	2.0	
Leghorn-type pullets	Litter	929	144	5.1	2.0	
Medium-size pullets	Litter	1116	173	6.1	2.4	
Meat-type pullets	Litter	1858	288	10.2	4.0	
Leghorn cockerels	Litter	1393	216	7.6	3.0	
Medium-size cockerels	Litter	1677	260	9.1	3.6	
Meat-type cockerels	Litter	2786	432	15.2	6.0	
Laying pens						
Mini-Leghorn	Litter	1161	180	6.1	2.4	
Leghorn-type	Litter	1625	252	7.6	3.0	
Medium-size	Litter	1858	288	8.4	3.3	
Mini-Leghorn	Slat-and-litter	929	144	6.1	2.4	
Leghorn-type	Slat-and-litter	1393	216	7.6	3.0	
Medium-size	Slat-and-litter	1625	252	8.4	3.3	
Mini-Leghorn	All-slat or all-wire	697	108	6.1	2.4	
Leghorn-type	All-slat or all-wire	1161	180	7.6	3.0	
Medium-size	All-slat or all-wire	1393	216	8.4	3.3	
Breeder flocks (males and females)						
Mini-Leghorn	Litter	1393	216	8.3	3.25	
Leghorn-type	Litter	1858	288	9.5	3.75	
Medium-size	Litter	2090	324	10.8	4.25	
Mini-meat-type	Litter	2090	324	12.7	5.0	
Meat-type	Litter	2786	432	15.2	6.0	
Hens (fed separately)	Litter			15.2	6.0	
Males (fed separately)	Litter			20.3	8.0	
Mini-Leghorn	Slat-and-litter	1161	180	8.2	3.25	
Leghorn-type	Slat-and-litter	1625	252	9.5	3.75	
Medium-size	Slat-and-litter	1858	288	10.8	4.25	
Mini-meat-type	Slat-and-litter	1858	288	12.7	5.0	
Meat-type	Slat-and-litter	2090	324	15.2	6.0	
Hens (fed separately)	Slat-and-litter			15.2	6.0	
Males (fed separately)	Slat-and-litter			20.3	8.0	
Wire-and-litter						
Same requirements as for Slat-and-litter						
Cage housing^b						
0 to 6 wk						
Mini-Leghorn	Wire	97	15	2.5	1.0	
Leghorn-type	Wire	97	15	2.5	1.0	
Medium-size	Wire	155	24	3.0	1.2	

(continued)

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TABLE 8-1. (continued) Minimum Floor Area and Feeder Space for Chickens, Turkeys, and Ducks in Multiple-Bird Pens and Cages Recommended for Use in Agricultural Research and Teaching.

Species, type, and developmental stage	Type of housing and floor	Floor area/bird		Feeder space/bird ^a	
		(cm ²)	(in ²)	(cm)	(in)
6 to 12 wk					
Mini-Leghorn	Wire	194	30	3.8	1.5
Leghorn-type	Wire	194	30	3.8	1.5
Medium-size	Wire	310	48	4.3	1.7
12-20 wk					
Mini-Leghorn	Wire	258	40	5.1	2.0
Leghorn-type	Wire	290	45	5.1	2.0
Medium-size	Wire	348	54	6.1	2.4
>20 wk and laying hens					
Mini-Leghorn	Wire	348	54	6.1	2.4
Leghorn-type	Wire	387	60	7.6	3.0
Medium-size	Wire	452	70	8.4	3.3
Broilers	Floor pen housing				
<i>Rearing to final market weight</i>					
0 to 3 wk (brooding)	Litter	232	36	4.3	1.7
>3 wk	Litter	374	58	4.3	1.7
.9 to 1.1 kg	Litter	374	58	4.3	1.7
1.1 to 1.6 kg	Litter	555	86	7.6	3.0
1.6 to 2.1 kg	Litter	742	115	11.4	4.5
> 2.1 kg	Litter	929	144	11.4	4.5
Turkeys	Floor pen housing				
<i>Brooding (0 to 6 wk)</i>	Litter	464	72	1.9	.75
<i>Weight (after brooding)</i>					
< 3 kg	Litter	929	144	1.9	.75
3 to 7 kg	Litter	1857	288	1.9	.75
3 to 12 kg	Litter	3250	504	3.8	1.5
> 12 kg	Litter	3715	576	3.8	1.5
Ducks ^c	Floor pen housing ^d				
Meat/egg type	Total and semiconfinement				
<i>Brooding/growing, wk</i>					
1	Litter ^e	232	36	.9	.35
2	Litter	464	72	1.0	.4
3	Litter	839	130	1.3	.5
4	Litter	1116	173	1.5	.6
5	Litter	1393	216	1.7	.65
6	Litter	1671	259	1.8	.7
7	Litter	1858	288	1.9	.75
1	Wire	232	36	.9	.35
2	Wire	439	68	1.0	.4
3	Wire	651	101	1.3	.5
4	Wire	974	151	1.5	.6
5	Wire	1187	184	1.7	.65
6	Wire	1413	219	1.8	.7
7	Wire	1625	252	1.9	.75

(continued)

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TABLE 8-1. (continued) Minimum Floor Area and Feeder Space for Chickens, Turkeys, and Ducks in Multiple-Bird Pens and Cages Recommended for Use in Agricultural Research and Teaching.

Species, type, and developmental stage	Type of housing and floor	Floor area/bird		Feeder space/bird ^a	
		(cm ²)	(in ²)	(cm)	(in)
<i>Developing breeders, wk</i> 7 to 28	Litter ^f	2322	360	10.2 ^g	4.0 ^g
<i>Laying breeders</i> All stages	Litter	3251	504	2	.8

^aSpace on one side. When access is available from both sides, the amount of space available is doubled.

^bCages should allow birds to stand erect.

^cSpace recommendations for ducks were determined with Pekin ducks. The allocations given should be adequate for all domesticated breeds, but they may be slightly excessive for some of the smaller breeds.

^dIf ducks are under semiconfinement, allow indoor space equal to the amount recommended for total confinement.

^eWaterers located on wire-covered section with cement drain underneath.

^fDeveloping breeders may be raised outdoors on well-drained soil (preferably sand) with open shelter. A minimum of 1290 cm² (200 in²) of shelter area/bird should be provided.

^gAdditional space is allowed for restricted feeding.

assumed adequate when productivity of the individual birds is optimal and when conditions likely to produce injury and disease are absent.

When cage housing is involved, it is assumed that the cages have wire floors that allow waste to drop through unless otherwise stated. Recommended floor space excludes space taken up by feeders and waterers if those are located within the cage and take up floor space. Waterers should be readily available to all birds in each cage.

Singly caged birds are frequently used in agricultural research and teaching to establish or demonstrate fundamental principles and techniques. Because within-cage competition for feed and water is absent, feeding and watering spaces are not critical; however, individually caged birds must have ready access to sources of feed and water. Table 8-2 presents recommended floor area allowance for adult chickens, turkeys, and ducks when kept in single-bird cages. A recommended minimum dimension is given that will allow birds to turn around within their cages.

LITTER (BEDDING)

Poultry may be kept equally well on either solid floors with litter or in cages or pens with raised wire floors of appropriate mesh. When poultry reside on solid floors, litter provides a cushion during motor activity and resting and absorbs water from droppings. The ideal litter can absorb large quantities of water and also release it quickly to promote rapid drying. The poultry house should be ventilated to maintain litter in a slightly moist condition.

Some of the materials used for litter, depending on local availability, include rice hulls, straw, wood sawdust or shavings, and cane bagasse. Because litter materials

differ in ability to absorb and release water, husbandry practices should be varied to maintain proper litter conditions. Litter being stored for future use should be kept dry to retard mold growth.

Caged hens may cease egg production temporarily or even undergo a molt (suggesting that they are stressed) if removed from the cages to which they have become accustomed. With appropriate air cleanliness and manure disposal from under their cages, laying hens and roosters may be kept in the same cages for 18 mo or longer without adverse effects on their health.

When poultry are kept in cages or on raised floors, accumulated droppings should not be permitted to reach the birds. Droppings should be removed at intervals reflecting industry practice and stated in the protocol.

Flooring for Ducks. Particular attention should be paid to the type of floor provided in pens or cages for the common duck because the epidermis of the relatively smooth skin on the feet and legs of this species is less cornified than that of domesticated land fowl (Koch, 1973) and therefore is more susceptible to injury. Properly designed, nonirritating floor surfaces minimize or prevent injury to the foot pad and hock and subsequent joint infection.

Dry litter floors are least irritating to the feet and hock joints of ducks and should be used whenever possible, particularly if ducks are going to be kept for extended periods. Litter floors that are not kept dry present a serious threat to the health of the flock.

Wire floors and cage bottoms of proper design may be used without serious adverse effect if the ducks are not kept on wire for more than 2 or 3 mo. Younger ducks are less susceptible to irritation from wire than are older

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TABLE 8-2. Minimum Floor Area for Sexually Mature Chickens, Turkeys, and Ducks in Single-Bird Cages Recommended for Use in Agricultural Research and Teaching.^a

Species and type	Type of floor	Floor area/bird		Minimum dimension	
		(cm ²)	(in ²)	(cm)	(in)
Chicken					
Mini-Leghorn pullets	Wire	722	112	20.3	8
Leghorn-type pullets	Wire	826	128	20.3	8
Medium-size pullets	Wire	1032	160	25.4	10
Meat-type pullets	Wire	1032	160	25.4	10
Mini-Leghorn cockerels	Wire	826	128	20.3	8
Leghorn cockerels	Wire	929	144	20.3	8
Medium-size cockerels	Wire	1161	180	25.4	10
Dwarf-meat cockerels	Wire	1161	180	25.4	10
Meat-type cockerels	Wire	1393	216	30.5	12
Turkey					
< 10-kg hens	Wire	2670	414	45.7	18
All wt toms	Solid (litter)	4644	720	61.0	24
Duck					
Pekin (both sexes)	Wire	1625	252	30.5	12

^aCages should allow birds to stand erect.

ones. Egg-type breeds (e.g., Khaki Campbell) are not as large as meat breeds (e.g., Pekin) and are less likely to be affected.

Properly constructed wire floors and cage bottoms should provide a smooth, rigid surface, free of sags and abrasive spots. The 2.5-cm (1-in) mesh, 12-gauge welded wire is usually satisfactory for ducks of all ages over 3 wk. Mesh size should be reduced to 1.9 cm (3/4 in) for ducklings under 3 wk of age. Vinyl-coated wire is preferable, but stainless steel or smooth, galvanized wire is satisfactory. Slats are not recommended for ducks, because leg abnormalities have developed in many ducks kept in research pens with slatted floors.

Irritation to the feet and legs of ducks is reduced greatly, if hard flooring such as wire occupies only a portion of the total floor area of a pen. In large floor pens, one-third wire and two-thirds litter is a satisfactory combination, provided that drinking devices are located on the wire-covered section of the pen, which greatly reduces the transport of water from the drinking area to the litter.

Maintenance of litter in a satisfactorily dry condition is considerably more difficult in housing for ducks than in that for chickens and turkeys. Ducklings drink approximately 20% more water than they need for normal growth (Veltmann and Sharlin, 1981), and as a result, the moisture content of their droppings is relatively high—approximately 90% (Dean, 1984). To offset this extra water input in duck houses, extra litter and removal of excess water vapor by the ventilation system are essential. Supplemental heat is often necessary to aid in moisture control.

FEEDING PROGRAMS THROUGHOUT LIFE

Because meat-type chickens have been bred for rapid growth to market age, obesity of breeder stocks is a problem unless their energy intake is controlled from early life on. Feed allocations should maintain a recommended body weight for the particular stock and age. Rations may be either for a fixed amount of feed daily or allotted for a longer period under various alternate-day feeding schemes.

Chickens and ducks adapt rapidly to intermittent fasting. Procedures that require restricted feeding should have enough feeder space so that all birds can eat concurrently.

Ducks experience difficulty consuming dry mash, because the moistened mash tends to cake on their mouth parts. Therefore, it is recommended that all feeds for ducks be provided in pelleted form. Pellets no larger than .40 cm (5/32 in) in diameter and approximately .80 cm (5/16 in) in length should be fed to ducklings under 2 wk of age. Pellets .48 cm (3/16 in) in diameter are suitable for ducks over 2 wk of age.

WATER

Newly hatched birds may have difficulty obtaining water unless they can find waterers easily. Similar difficulties may occur when older birds are moved to strange surroundings, especially if the type of watering device differs from that which they used previously.

Watering cups that require birds to press a lever or other releasing mechanism involve operant conditioning. Because individuals may fail to operate the releasing

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mechanism by spontaneous trial and error, shaping of the behavior may be required. Thus, watering cups may need to be filled manually for several days (or weeks in some cases) until the birds have learned the process. Water pressure must be regulated carefully with some automatic devices and watering cups. In such cases, pressure regulators and pressure meters should be located close to the levels at which water is being delivered. Manufacturers' recommendations should be used initially and adjusted if necessary to obtain optimal results. Automatic watering devices may require frequent inspection to avoid malfunctions that can result in flooding or stoppage. Recommendations for watering devices are given in Table 8-3.

Poultry ordinarily should have continuous access to clean drinking water. However, with some restricted feeding programs, overconsumption of water may occur, leading to production of overly wet droppings. This may be controlled by restricting excessive water intake, usually by limiting water availability to certain times of the day, in accordance with accepted management programs that take into account when feed is available and environmental temperature conditions. Water may also be shut off temporarily in preparation for administration of vaccines or medications by means of the watering system. Watering space recommendations vary widely depending on species, type, bird density, and whether water intake is restricted (Table 8-3). Waterers should be examined frequently to ensure their proper operation.

Ducks. Most conventional poultry drinkers can be used for ducks except for cup drinkers that are smaller in diameter than the width of the duck's bill. Nipple drinkers support slightly poorer duck performance during hot weather than do trough waterers.

Ducks will grow, feather, and reproduce normally without access to water for swimming or wading, but weight gain may be improved slightly during summer months if such water is provided (Dean, 1967). If ducks are provided water for swimming or some other wet environment, they should also have access to a clean and dry place; otherwise, they will be unable to preen their feathers and down properly, and the protection normally provided by this waterproof, insulated layer will be lost.

BROODING TEMPERATURES AND VENTILATION

Because thermoregulatory mechanisms are poorly developed in young chicks, pouls, and ducklings, higher environmental temperatures are required during the brooding period than subsequently. A variety of brooding

environments are available that meet young birds' requirements (e.g., floor pen housing with hovers or radiant heaters distributed in localized areas, battery brooders, and cage or pen units in heated rooms).

Ventilation is ordinarily reduced, at least during the first few weeks of the brooding period, to conserve heat. Whether ventilation is by a mechanical system or involves natural air flow, drafts should be avoided and streams of air minimized that impinge upon portions of pens or groups of cages. In relatively open brooding facilities, as with houses having windows for ventilation and with chicks kept in floor pens, draft shields may prove beneficial during the 7 to 10 days after hatching except during hot summer months.

Young birds may huddle together or cluster when sleeping but are likely to disperse when awake. Within limits, birds will maintain appropriate body temperatures by moving away from or toward sources of heat when that is possible and by seeking or avoiding contact with other individuals. Extreme huddling of young birds, especially when awake, usually indicates a need for more supplemental heat; dispersal, associated with panting, indicates that the environment is too warm.

It is suggested that with brooding systems that allow birds to move toward or away from heat sources, temperature surrounding the brooding area should be at least 20 to 25°C during the first few weeks but not be so high as to cause the young birds to pant or show other signs of hyperthermy.

Areas with minimum temperatures adequate for comfort and absence of chilling should be available to young birds. The following minimum temperatures and weekly decreases until supplementary heat is no longer needed are suggested: for chicks, 32 to 35°C (90 to 95°F) initially, decreasing by 2.5°C (4.5°F) weekly to 20°C (68°F) (however, for some well-feathered strains, supplemental heat may be discontinued at 3 wk if room temperature is 22 to 24°C [72 to 75°F]); for pouls, 35 to 38°C (95 to 100°F), decreasing by 3°C (5°F) weekly to 24°C (75°F); and for ducklings, 26.5 to 29.5°C (80 to 85°F), decreasing by 3.3°C (6°F) weekly to 13°C (54°F). After the brooding period, ducklings are comfortable at environmental temperatures of 18 to 20°C (64 to 68°F).

Ventilation for Ducks. Ventilation rates recommended for chickens and turkeys have given good results with ducks (Davis and Dean, 1968). Generally, however, lower relative humidity is desirable in duck houses to help to offset the higher water content of duck droppings. Proper screening underneath watering equipment in houses with litter floors and the addition of generous amounts of litter are necessary features of the moisture

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TABLE 8-3. Minimum Watering Space Recommendations for Chickens, Turkeys, and Ducks Used in Agricultural Research and Teaching.

Species, type, and developmental stage	Trough watering space/bird ^a		Cups — (no./100 birds) —	Drip-type — (no./100 birds) —		
	(cm)	(in)				
Chickens^b						
<i>Floor pen housing</i>						
wk 1 (provide one 3.785-L [1-gal] or four .95-L [1-qt] chick waterers/100 chicks)						
0 to 6 wk						
Egg-type chicks	1.5	.6	7	10		
Meat-type pullets	1.9	.75	8	11		
Meat-type cockerels	2.5	1.0	9	12		
6 to 20 wk						
Mini-Leghorn	1.5	.6	6	9		
Leghorn-type	1.9	.75	7	10		
Medium-size	2.2	.85	8	11		
Mini-meat-type	2.2	.85	8	11		
Meat-type pullets	2.5	1.0	9	12		
Meat-type cockerels	3.2	1.25	10	13		
Laying phase						
Mini-Leghorn	2.5	1.0	8	8		
Leghorn-type	2.5	1.0	8	8		
Medium-size	3.2	1.25	8	8		
<i>Cage housing of pullets</i>						
6 wk						
Mini-Leghorn	1.5	.6	33	20		
Leghorn-type	1.5	.6	25	20		
Medium-size	1.9	.75	19	18		
6 to 20 wk						
Mini-Leghorn	1.5	.6	24	18		
Leghorn-type	1.9	.75	15	15		
Medium-size	2.2	.85	13	12		
>20 wk						
Mini-Leghorn	2.5	1.0	19	15		
Leghorn-type	2.5	1.0	12	12		
Medium-size	3.2	1.25	10	9		
Turkeys^c						
<i>Floor pen housing</i>						
<i>Three-stage rearing</i>						
Females						
0 to 5.5 wk	1.3	.5				
5.5 to 11.0 wk	1.3	.5				
11 to 16.5 wk	1.3	.5				
<i>Five-stage rearing</i>						
Males						
0 to 4 wk	1.3	.5				
4 to 8 wk	1.3	.5				
8 to 12 wk	1.9	.5				
12 to 16 wk	1.9	.75				
16 to 20 wk	2.5	1.0				

(continued)

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TABLE 8-3. (continued) Minimum Watering Space Recommendations for Chickens, Turkeys, and Ducks Used in Agricultural Research and Teaching.

Species, type, and developmental stage	Trough watering space/bird ^a		Cups	Drip-type
	(cm)	(in)		
<i>Breeders^d</i>				
Females				
8 to 16 wk	1.9	.75		
16 to 30 wk	1.9	.75		
> 30 wk (breeder pen)	1.9 2.5	.75 (ad libitum) 1.00 (restricted)		
Males				
8 to 16 wk	1.9	.75		
16 to 25 wk	1.9	.75		
> 25 wk (breeder pen)	1.9 2.5	.75 (ad libitum) 1.00 (restricted)		
Ducks				
Brooding/growing wk 0 to 7	1.9	.75	10	15
Developing breeders wk 7 to 28	2.5	1.00	12	18
Laying breeders All stages	2.5	1.00	12	18

^aSpace on one side of trough only. When access is available from both sides, the amount of space is double that of trough length.

^bModified from North (1984).

^cModified from Berg and Halvorson (1985).

^dSpace during earlier ages would be the same as for market turkeys.

^eCups approximately 7.6 cm (3 in) in diameter and 2.5 cm (1 in) deep of the "Swish" type.

control program. When outside temperature allows, supplemental heat may be used to help to control moisture buildup in duck houses.

SPECIAL CATEGORY OF STANDARD AGRICULTURAL PRACTICES

Although beak-trimming of broilers at hatching is standard practice in some areas, it is not in others. Therefore, the choice of beak-trimming or not for broilers should be a matter of choice. Egg-strain chicks are usually beak-trimmed a few days or weeks after hatching but before the laying period begins. When beak-trimming is minimal to moderate, it may be desirable to "touch up" beaks where regrowth has occurred. The usual procedure is to remove less than half of the upper beak between the beak tip and nostril. A lesser portion of the lower beak should be removed. A cauterizing blade or laser is effective in preventing subsequent bleeding and regrowth. A sharp blade should be used and the temperature for cauterizing

controlled to prevent excessive tissue damage. Care should be taken to avoid burning the tongue. Proper beak-trimming does not impair mating efficiency. The entire flock should be beak-trimmed at one time. When meat-type males are to be used in natural matings, the practice of removing certain toe nails entirely at 1 day of age should be considered; toe nail removal of breeding males prevents scratching and mutilation of females during mating.

Feather-pecking is a vice that sometimes occurs in ducks and may be controlled by either partial removal of the nail of the upper bill or inhibition of the growth of the nail by heat treatment (Dean, 1982). If not controlled, feather-pecking will injure the feather follicles of the tail, wings, and back, and the protective feather and down covering will break down.

Other standard husbandry practices for poultry are discussed in Chapter 2.

CHAPTER 9: GUIDELINES FOR SHEEP AND GOAT HUSBANDRY

Although sheep and goats are similar in many ways, facilities and husbandry techniques should take into account their many differences.

ANIMAL ENVIRONMENT

Sheep and goats used in agricultural research and teaching may be maintained under a wide variety of conditions, ranging from pasture or range to intensive systems (MWPS, 1982). The management system should be appropriate for the research or teaching objectives and should provide resources for proper care of the animals.

Sheep and goats will usually be subject to the climatic conditions of their locale. Provision of additional feed and protection from wind and precipitation should be provided if the animals are in danger of experiencing hypothermy. In intensive production facilities, ventilation should prevent moisture condensation during cold weather and excessively high temperature during hot weather. Shearing of sheep, provided temperatures are mild, reduces the moisture load during winter housing. Newly shorn sheep are susceptible to hypothermy, hyperthermy, and sunburn, so appropriate shelter may need to be provided and frequency of observation increased.

Newborn lambs and kids are very susceptible to hypothermy, and they should be moved to areas within their respective thermoneutral zones as soon as possible. A well-insulated, draft-free environment and zone heat should be provided during very cold or wet conditions. When shelter is not available, lambing and kidding dates should be planned to minimize the possibility of subjecting neonates to cold or wet weather.

To reduce the possibility of hyperthermy during hot weather, sheep should have access to adequate water. Sunshade may be desirable in some situations. Breeding dates should be selected insofar as possible to prevent exposure of ewes in late gestation to environmental temperatures consistently above their thermoneutral zone. In intensive management facilities, if exposure to high environmental temperatures is prolonged, floor area and ventilation rate should be increased. During hot weather,

handling or driving sheep or goats should be restricted to early morning or late afternoon.

HOUSING

Provision should be made to shelter sheep and goats after they are sheared when shearing is performed during cold weather (i.e., when effective environment temperature is below the lower critical point of the shorn animal). Goats require shelter from rain.

Sheep and goats, particularly those with horns, are susceptible to becoming entrapped in fencing. Fences should be kept in good repair and have spaces either small enough to prevent animals from reaching through with their heads or large enough to allow them to withdraw the head easily. Electric fences avoid these problems.

AREA

In range, pasture, or dry-lot conditions, area requirements are determined by available feed and by prevailing weather conditions (to prevent excessive mud); thus, area requirements will vary considerably from location to location depending on conditions.

Area requirements in intensive production systems are based on freedom of movement, minimization of injuries, and waste management. Recommended minimum areas are listed in Table 9-1. Horned animals, those with heavy fleeces, and females in late gestation require additional space.

FEED AND WATER

Sheep and goats should be fed according to established nutrient requirements to provide for proper growth in young animals and long-term maintenance of body weight, condition, and reproduction in adults (NRC, 1985). Sheep and goats may vary considerably in body weight during grazing and reproductive cycles. Feeding programs should make it possible for animals to regain the body weight lost during the normal periods of negative energy balance. Sheep and goats should have continuous access to water.

A wide variety of feedstuffs may be fed to sheep and goats, but changes in the roughage and concentrate com-

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TABLE 9-1. Minimum Floor Area and Feeder Space Recommendations for Confined Sheep Used in Agricultural Research and Teaching.^{a,b}

Facility	Floor type	Rams (180–300 lb, 80–135 kg)		Dry ewes (150–200 lb, 65–90 kg)		Ewes and lambs (additional creep area required) ^c		Lamb creep area (5–30 lb, 2–14 kg)		Feeder lambs (30–110 lb, 14–50 kg)	
		(m ²)	(ft ²)	(m ²)	(ft ²)	(m ²)	(ft ²)	(m ²)	(ft ²)	(m ²)	(ft ²)
Building floor area	Solid	1.86–2.79	20–30	1.12–1.49	12–16	1.30–1.80	14–19 ^c	.14–.19	1.5–2.0	.74–.93	8–10
	Slotted	1.40–1.86	15–20	.74–.93	8–10	.93–1.12	10–12 ^c	.14–.19	1.5–2.0	.37–.46	4–5
Lot area	Dirt	2.32–3.72	25–40	2.32–3.72	25–40	2.79–4.65	30–50	...	...	1.86–2.79	20–30
	Paved	1.49	16	1.49	16	1.86	20	...	...	.93	10
Feeder space	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	
	Limit fed	30.48–50.80	12–20	30.48–50.80	12–20	40.64–50.80	16–20	22.86–30.48	9–12	22.86–30.48	9–12
	Self fed	7.62–15.24	3–6	7.62–15.24	3–6	10.16–20.30	4–8	5.08	2	2.54–5.08	1–2

^a Adapted from Midwest Plan Service (1982).^b Space requirements should be increased for fully fleeced or horned sheep and during hot weather.^c Increase space if lambing rates exceed 170%.

position of the diet should be made gradually. The animals should be closely monitored during the transition period to avoid development of conditions such as acidosis or clostridial enterotoxemia.

Feeding and watering equipment should be designed to prevent injury to animals and to prevent contamination of feed with excreta. Feedbunks and water sources should be monitored daily and contaminants removed.

SOCIAL ENVIRONMENT

Because goats and sheep are highly social animals, they should, when possible, be maintained in groups to avoid unnecessary stress (Kilgour and de Langen, 1970). Individuals isolated from the flock or recently separated from close social companions (e.g., at weaning) should be monitored frequently to reduce the possibility of injury during separation.

New individuals may be introduced into sheep flocks with relatively little social strife. However, during the breeding season, rams may severely injure each other. Care should be taken to prevent excessive fighting among males when they are newly mixed. Although horned and polled animals may be penned together, care should be taken to ensure that the polled animals do not become victimized.

Goats have a strong social hierarchy, and addition of several goats to an established group is generally less stressful and more successful than addition of an individual. Enough space and multiple feeders should be available to prevent individuals from dominating the feed and water supplies.

In intensive production conditions, group size during the lambing or kidding season should be fewer than 100 females, unless provision is made in facility design or

by frequent observation to reduce the incidence of mis-mothering. Facilities and management should protect against animals crowding or piling on each other during periods of holding, handling, or transportation. An environment enriched with objects for climbing may reduce piling up.

RESTRAINT

Sheep and goats are routinely restrained in a number of ways. Restraint by hand is the most appropriate method when personnel perform many procedures. Animal care personnel should be taught how to catch and hold sheep and goats properly. They should not be caught or held by the wool or hair. Sheep and goats may be restrained for short periods in trimming or milking stands; by halter, collar, or leg tie; or by a tilting squeeze chute, but while restrained in these ways, they should be attended at all times.

To facilitate bonding, individual ewes or does may be restrained in stanchions with foster young or in small pens after parturition with their own young. Restraint for longer than 1 wk is unlikely to improve the dam-young bond.

General guidelines for maintaining animals in metabolism stalls are given in Chapter 2. Sheep and goats ordinarily should not be kept in a stall for longer than 6 or 8 wk at one time, and if possible they should be given the opportunity to exercise at intervals. A stall should be 1.4 m (4.5 ft) long (exclusive of feeder) for adult sheep and 1 m (3.5 ft) for lambs; it should be .2 m (8 in) wider than the standing animal. When possible, stalls should be situated so that the sheep or goats can see one another.

When mature sheep are penned individually and allowed to turn around, they should have 1.5 to 1.9 m² (16 to 20 ft²) of space, depending on size. Individually

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Held lambs up to 45 kg (100 lb) should have .75 m² (8 ft²).

Training of animal care personnel and stock dogs in handling and management procedures should include consideration of the well-being of the sheep and goats.

HUSBANDRY PROCEDURES

Ear-notching, ear-tattooing, tail web-tattooing, ear-tagging, shearing, and hoof-trimming are among the routine husbandry procedures that may be performed on goats and sheep at any age. Correction of entropia should be performed at as early an age as possible. Tooth-grinding of incisor tips may be performed to correct a poor bite, pending further research on the benefits of this procedure, but it should not be performed to correct a "broken mouth". Immunization should be provided against pertinent diseases (e.g., enterotoxemia).

Docking. Tail-docking of lambs is necessary unless the lambs' life span will be limited to a season when fly infestations are unlikely and the feed used will not result in heavily contaminated fleeces. Very short docking is generally discouraged because it probably causes rectal and vaginal prolapses. Docking may be accomplished by several means (Outhouse, 1981) but should be done at as early an age as possible, preferably before 2 wk of age. Tail-docking with an emasculator should be done before 1 wk of age. Removal of the tail after 2 mo of age should be performed under local anesthesia and with special care to prevent heavy blood loss.

Castration. Although it is not essential to castrate male lambs, intact males are discounted by many packers due to a perceived difficulty in pelt removal. Also, ram lambs left intact may reach puberty before market time and require separation from ewes. Some intact male kids develop a sex-related odor.

Castration should be performed at an early age. Tetanus antitoxin should be given at the same time when there is risk of tetanus. When a surgical method of castration is used, lambs and kids should be less than 2 mo of age or else a local anesthetic should be used and special care taken to minimize hemorrhage and infection. It is far

preferable to castrate a young animal. In older animals, it is safer and less traumatic to use a burdizzo-type instrument to crush the spermatic cord, leaving the testicles in situ. This technique also is suitable for Angora goats intended to be used for mohair production, which are typically castrated at 7 to 10 mo of age in order to allow a larger, more robust animal to develop. In a research institution, crushing of the spermatic cord in older animals should be performed under anesthesia.

Dehorning. Dehorning and descending of goats may be performed without the use of anesthetic before the age of 1 mo. Removal of horns of an adult animal should be done under general anesthetic or sedation and local anesthetic. Horn-tipping in both goats and sheep may be performed at any age without anesthesia.

PREDATOR CONTROL

In certain geographic locations and during certain seasons, protection from predators (e.g., dogs and coyotes) is an important part of providing adequate care for sheep and goats. Nonlethal means of predator control are preferable but may be inadequate. Special fencing can be used to exclude predators from livestock pastures. Lethal means of control are appropriate when necessary to reduce injury or loss of sheep and goats. State and local ordinances must be followed.

LIGHTING

Sheep and goats kept in enclosed houses should experience a diurnal cycle of light and dark; photoperiod and intensity should be adequate for inspection, maintenance of activity patterns, and, for breeding animals, physiological control of reproductive functions (Ortavant, 1977). In the case of photocontrol of reproduction, a controlled lighting system should be used. Although natural daylight ordinarily is sufficient for sheep in most situations, supplemental lighting should be provided during the lambing season to facilitate more frequent observation of the animals.

CHAPTER 10: GUIDELINES FOR SWINE HUSBANDRY

SWINE PRODUCTION SYSTEMS

Swine may be kept in a variety of systems (Pork Industry Handbooks, undated and 1978 to present; MWPS, 1983). The level of management applied in the respective systems will determine how much comfort the animals experience. Specific attention should be paid to effective environmental temperature (Table 10-1), ventilation, vapor pressure, floor condition, area per animal, waste management, and feed and water quantity and quality. A predictable daily management routine will allow pigs to develop a routine of their own. Animal care personnel should anticipate climatic extremes and provide appropriate husbandry to minimize environmental stressors and animal distress.

Attention should be given to pig dunging and resting preferences during the design phase as well as the day-to-day operation of all swine facilities. Movement of waste between pens should be minimized. Likewise, animal care personnel should take necessary precautions to prevent transmission of pathogens between pens and between facilities, even at the same locale. Disinfectant footbaths used as personnel move between houses will reduce inter-building transmission of pathogenic microorganisms. Animal care personnel in swine research and teaching facilities should not be in contact with swine elsewhere.

Pigs should be observed and their well-being assessed at least twice each day. Feeders and waterers should be checked to be sure they are functional. Feeders and waterers should allow easy access by swine with minimal waste of feed and minimal contamination by feces and urine. A water medicator may be used for management of enteric infections. When feed is delivered to animal houses and to individual pens, care should be taken to minimize dust generation.

FARROWING SYSTEMS

Sow Management. Some degree of restraint of the periparturient sow is necessary. Even in extensive housing systems, sows should be provided a small house or pen in which they can be detained and, conversely, from which groupmates can be excluded. During farrowing, sows should be isolated from physical contact with other mature animals.

Presence of a caretaker during parturition is desirable

but not mandatory; however, this component of the system should be included in the planning phase of the research or teaching operation. Floor space recommendations are in Table 10-2.

Farrowing environments should be cleaned and disinfected before the preparturient sow is allowed to enter. Sows may be treated to eliminate internal and external parasites before they enter the farrowing area. Appropriate vaccinations should be administered in accordance with the manufacturer's guidelines and government regulations and long enough in advance of parturition to allow accumulation of specific antibodies in the colostrum. Laxative additives may be fed before and after parturition to minimize constipation.

During hot weather (daily maximum temperature above 32°C [90°F]), sows should be zone-cooled. This can be accomplished by either dripping water directly on the sow, providing directed air currents (snout coolers), or, in extensive systems, by allowing sows to wet themselves with water or mud.

Litter Management. Piglets require special attention because they are born with little energy and immunoglobulin reserves, have poor ability to thermoregulate, and are vulnerable to being crushed. Piglets should be provided with a warm, draft-free, zone-heated area until weaning, and they should be protected from being crushed or injured by the sow.

The lower critical temperature of the piglet is about 35°C (95°F) at birth. Therefore, a warm, dry, draft-free piglet area should be provided to the sow before and after farrowing. The entire space in the house should not be heated to an air temperature above the piglets' lower critical temperature because the sow would become heat-stressed.

Any of the following procedures may be performed on piglets within 24 hr after birth: navel disinfected (if farrowing attended), needle teeth trimmed with a disinfected sharp device, tail trimmed to no less than 2.5 cm (1 in) from the body with a disinfected device (if piglets are to be raised in intensive quarters), supplemental iron injected (if piglets are to be nursed indoors), and individual identification (usually ear notches).

Piglets may be weaned between 2 and 8 wk of age, preferably between 3 and 5 wk of age. Early weaning (before 2 wk of age) should be practiced only if a large

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TABLE 10-1. Recommended Thermal Conditions for Swine Used in Agricultural Research and Teaching.

Type and weight	Preferred range ^a	Lower extreme ^b	Upper extreme ^c
Lactating sow and litter	15 to 26°C (59 to 79°F) for sow (piglets have 32°C (90°F) minimum creep area	25°C (77°F) creep area 15°C (60°F) sow area	32°C (90°F) for sow, no practical upper limit for piglets
Prenursery, 5 to 15 kg (11 to 33 lb)	26 to 32°C (79 to 90°F)	15°C (59°F)	35°C (95°F)
Nursery, 15 to 35 kg (33 to 77 lb)	18 to 26°C (64 to 79°F)	5°C (41°F)	35°C (95°F)
Growing, 35 to 70 kg (77 to 154 lb)	15 to 25°C (59 to 77°F)	-5°C (23°F)	35°C (95°F)
Finishing, 70 to 100 kg (154 to 220 lb)	10 to 25°C (50 to 77°F)	-20°C (4°F)	35°C (95°F)
Sow or boar, > 100 kg (> 220 lb)	10 to 25°C (50 to 77°F)	-20°C (4°F)	32°C (90°F)

^aBased on NRC (1981); DeShazer and Overhults (1982); Hahn (1985); Curtis (1985b).^bThese represent lower extremes in air temperature when pigs are held in groups. Bedding is recommended when air temperature approaches the lower extreme.^cExcept for brief periods, above these air temperatures, cooling should be provided by means such as evaporatively cooled air for growing pigs or a water drip for lactating sows.

input of labor and specialized diets are available (Lecce, 1986).

Pens and Small Houses. Extensive farrowing environments are acceptable research and teaching models when they are managed to minimize discomfort to piglets and sows. Placement of preparturient sows in a large pasture or lot without proper management is not in the best interests of sows or piglets. Sows should be observed regularly; fences should be sturdy and well-constructed; proper health care for sows and piglets should be provided; and waste should be removed periodically from such systems as needs arise.

A farrowing house or pen should be cleaned and disinfected before each use. With only rare exceptions, solid-floored farrowing houses on pasture and pens in central

farrowing houses should be bedded with a suitable bedding material such as straw. Bedding should be kept reasonably dry by addition of more bedding material to it and by partial removal of soiled bedding at regular intervals as needed.

A typical farrowing pen measures at least 1.5 × 2.1 m (5 × 7 ft), but often it will be 3 × 3 m (10 × 10 ft). A protected area should be provided for piglets (at least .8 m² [8 ft²]). This area should have supplemental heat (e.g., a 250-W heat lamp). Guard rails should be placed on the perimeter of the pen to prevent the sow from crushing piglets against the wall.

Farrowing Crates. To reduce piglet injury and protect animal care personnel from overly aggressive periparturient sows, sows may be confined in farrowing crates

TABLE 10-2. Minimum Floor Area Recommendations for Swine Used in Agricultural Research and Teaching.

Stage of production	Individual (per pig)		Groups (per pig) ^a	
	(m ²)	(ft ²)	(m ²)	(ft ²)
Litter and lactating sow, pen	3.15	35	...	...
Litter and lactating sow, sow portion of crate	1.26	14	...	...
Nursery, 5 to 27 kg (12 to 60 lb body weight)	.54	6	.16 to .37	1.7 to 4.0
Growing, 27 to 57 kg (60 to 125 lb body weight)	.90	10	.37 to .56	4.0 to 6.0
Finishing, 57 to 104 kg (125 to 230 lb body weight)	1.26	14	.56 to .74	6.0 to 8.0
Adults ^b	1.26	14	1.49	16.0

^aGroup area allowances for growing pigs range from starting to ending weight in each phase.^bStall size minimum width = 56 cm (22 in) and minimum length = 2.2 m (7 ft). Young adult females may be housed in stalls of only 2 m (6.5 ft) length.

from day 109 of gestation until weaning at 2 to 8 wk after parturition. A farrowing unit employing a sow crate typically measures 1.5 × 2.1 m (5 × 7 ft), but the sow resides in a zone that typically measures .6 × 2.1 m (2 × 7 ft). As she lies down, she slides along the restraining walls, which reduces piglet deaths. In addition, each sow and litter can be attended individually.

With few exceptions, the floors under or to the rear of the sow zone in farrowing crates are slotted. In this way, sows and piglets are effectively and quickly separated from their excreta, and the environment dries quickly. Acceptable types of slotted floors include perforated metal, woven metal, plastic-coated metal, metal bars, fiberglass, concrete, and combinations of materials. The floor surface should be unabrasive, nonporous, and not slippery (Fritsch and Muehling, 1984). Slots between slats should be wider behind the sow (usually 2.5 cm [1 in]) to allow passage of excreta. These wider slot openings should be covered during parturition to enable piglets to walk easily. Narrower perforations or slots prevent piglets from getting their feet caught in the floor openings. Floor materials should be free of exposed or projecting materials to avoid injury to the leg, foot, or hoof. Bedding should be provided for farrowing crates equipped with solid floors.

NURSERY SYSTEMS

Nursery systems include those housing and management arrangements for newly weaned pigs. Typically, pigs reside in a nursery from weaning at 3 to 5 wk of age until 8 or 9 wk of age. This is a critical period in the pig's life because its diet and environment change markedly when it moves to the nursery.

The lower critical temperature of a 4-wk-old piglet (once it is eating at the rate of approximately 3 to 3.5 times thermoneutral maintenance) is around 26°C (79°F) (Table 10-1); therefore, most nurseries should be equipped with supplemental heating equipment. The only exception to this is when piglets remain suckling (and obtaining heat from) the sow until 8 wk of age. In addition to supplemental heat, nursery houses should be maintained at a higher degree of sanitation than is required for older pigs.

Nurseries should be operated on an "all-in, all-out" basis, and the facility should be cleaned and disinfected thoroughly between groups of pigs.

Weaned pigs should be self-fed a nutritionally complete and balanced diet unless the experimental protocol dictates otherwise (NRC, 1988b). Up to four pigs may share a single feeding space. All pigs should be provided ad libitum access to clean water. One watering device is

needed per 20 pigs.

A typical nursery pen should contain no more than 20 pigs. Floor area recommendations are in Table 10-2.

Slotted floors are common in nurseries. Flooring material may be similar to that in farrowing crate units. Pens with solid floors should be bedded. If partially slotted floors are used, the waterer should be located over the slots.

GROWING AND FINISHING SYSTEMS

The management of growing and finishing pigs (from 8 or 9 wk of age to market weight age of about 25 wk) differs from weanling pigs in that a lower standard of sanitation is required, units may be run with a continuous flow of pigs, and the older pigs can tolerate a much wider range of environmental temperature (Table 10-1).

Typically, growing and finishing pens are rectangular, and each pen contains no more than 20 pigs. Penning materials should be sturdier than those used in nurseries. Floor area recommendations are in Table 10-2.

Solid floors should have slope (e.g., 2%) to allow water and waste to flow to a drain or a pit. Slotted floors need not be sloped. Although many flooring materials are acceptable, concrete slats are excellent for slotted floors. Concrete slats should be 9 to 20 cm (3.5 to 8 in) wide with an approximately 2.5-cm (1-in) slot between adjacent slats. Edges of slats should be pencil-round to preclude foot-claw injuries, and sharp edges should be avoided. Partially slotted floors are acceptable. Open flush gutter systems are acceptable, but risk of contamination between pens is greater.

BREEDING AND GESTATION SYSTEMS

Sows, if managed properly, may be housed individually or in groups. When sows are kept in groups, social interactions are facilitated. When the group is fed a limited daily ration, competition for feed is often intense. Without intervention from animal care personnel, aggressive sows overeat while subordinates ingest inadequate amounts of feed. Aggressive behavior in swine is common, and, if swine are left unattended, serious injury may result.

Stall housing for sows allows the caretaker to control individual feed allowances precisely but restricts the movements of and among sows. A compromise is a group pen equipped with individual stalls used only at feeding time.

Efforts to define the well-being of sows in different gestation housing systems have led to contrasting results and inconclusive interpretations. At present there is no consensus among scientists in identifying those factors responsible for the lack of agreement among studies.

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Whether specific genetic strains of sows differ in their ability to adapt to particular housing environments has not been investigated (Beilharz, 1982). Inputs from managers, proper habituation, and selection of appropriate genetic stock appear to be primary contributors to the well-being of sows, independent of the gestation system used.

Housing. Recommended areas for breeding sows and boars of different types and sizes are listed in Table 10-2. For gilts that have been selected to enter the breeding herd, sexual development is hastened when they are kept in groups (10 to 12 per pen recommended in intensive production systems) with daily opportunity for contact with mature boars (at least 30 min).

Sows in group pens (e.g., 5 to 10/pen) and on restricted feed rations should be of uniform size and temperament. In extensive production systems, larger group sizes can be managed because feeding space per sow can be increased to reduce competition for feed.

Recommended dimensions for gestation stalls are .56 × 1.98 m and 1.02 m high (1.8 × 6.5 ft and 3.3 ft high) for gilts and .61 × 2.13 m and 1.02 m high (2 × 7 ft and 3.3 ft high) for sows. Standing sows and gilts should not be forcibly in contact with the sides, ends, or top of the stall.

Individual housing of mature boars is recommended to preclude aggressive interactions among boars. When mature boars unfamiliar with one another are penned together, intense fighting usually occurs. In systems where boars reside in small groups, they should be of similar size, and it is highly desirable that they be reared together since puberty.

Recommended dimensions of stalls for boars are .71 × 2.13 m and 1.17 m high (2.3 × 7 ft and 3.8 ft), but larger stalls may be required for extremely large boars.

Mating Facilities. Pen mating (placing a boar with sows unattended) and hand mating (personnel attending boar-sow matings) are mating options. With pen mating in pasture and dry-lot systems, primary considerations are to minimize extremes in environmental temperature, rest boars between mating sessions, and avoid putting young boars with old sows or old boars with gilts.

For pen mating in intensive production systems, area allowance and flooring are additional considerations. Pens should be at least 2.44 m (8 ft) wide and provide at least 1.86 m² (20 ft²) per sow or 1.6 m² (17 ft²) per gilt. One boar per pen is recommended. Slip-resistant, dry floors are required to prevent injury.

With hand mating, the sow usually is mated in a designated mating pen but may be mated in the sow's or the boar's pen. In any case, that pen should be a minimum

of 2.44 × 2.44 m (8 × 8 ft) and have a slip-resistant floor.

Flooring surface in mating pens should be considered during the planning and construction of the facility. In pens with an area of solid concrete, floors can be made slip-resistant by applying a wood float finish, a broom finish, or by placing grooves in the concrete. A 2.5-cm (1-in) diamond pattern has proved satisfactory (Levis et al., 1985). In pens used for hand mating but without good footing, absorbent substances or rubber mats may be placed on the floor.

CASTRATION

"Boar taint" is often an objectionable odor and flavor in meat from boars slaughtered at 100 kg (220 lb) body weight or heavier. Therefore, in view of United States packers' demand for heavier market hogs, almost all male pigs are castrated before slaughter. To minimize stress on the pig, castration should be performed as early as possible and preferably before 14 days of age. After this age, and particularly after 2 mo of age, local or general anesthetic should be administered. For boars of any age, disinfected instruments should be used for castration and a precastration disinfectant applied to the incision site. To allow proper drainage, the incision should not be sutured.

SPECIAL ASPECTS OF ENVIRONMENTAL MANAGEMENT

Lighting. The domestic pig is less sensitive to its photic environment than are some other species. In the wild, swine do not depend on vision as much as on other sensory systems (Kilgour, 1985). When able to control the photoperiod for themselves, pigs prefer some light and some dark every hour of the day and night (Baldwin and Meese, 1977); their apparent light-dark cycle preference is not similar to any natural situation.

No particular daily photoperiod is necessary for growing pigs (Berger et al., 1980). Developing breeding animals may benefit from long-day photoperiods (e.g., 16 hr light:8 hr dark), although results are still largely inconclusive (Zimmerman et al., 1980; Wheelhouse and Hacker, 1982). Lactating sows respond positively to daily 16-hr photoperiods, resulting in enhanced piglet performance, and they may return to estrus sooner (Mabry et al., 1982, 1983; Stevenson et al., 1983).

Social Environment. Pigs are, by nature, social animals. Young pigs show behavioral and physiological signs of stress when held in complete isolation from other pigs. Individual housing of growing pigs may be practical,

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although the precise relationship between group size and pig performance is neither predictable nor clear (Livingston et al., 1969; Patterson, 1985).

Adult sows are found in groups in nature, but in agricultural settings sows may be held in social groups that result in domination or subordination and may lead to excessive stress or trauma to individual sows. Feral boars are usually

solitary animals, except during the breeding season. Thus, in some cases, adult pigs housed individually may experience less stress than would growing pigs. Agricultural research that proposes to house growing pigs individually or in isolation from other swine should be approved by the committee. Brief periods (e.g., a few hours) of isolation (e.g., in transportation) are unavoidable.

CHAPTER 11: GUIDELINES FOR VEAL CALF HUSBANDRY

Special-fed veal calves usually are Holstein bull calves that are fed a milk formula diet and grown to approximately 16 wk of age with finished weight of 160 to 180 kg (350 to 400 lb). Meat from these calves is referred to as "milk-fed" veal. Bob veal refers to milk-fed calves, usually less than 3 wk of age, destined to be slaughtered. Grain-fed veal calves are reared on feeding programs using cereal-based formula feeds and hay. Meat from these calves is referred to as "red" veal.

Veal calves should be handled with care, gentleness, and patience. Stress on calves usually results in suboptimal physiological functions or adverse behavioral reactions and should be minimized to assure the animals' well-being and performance (Stott, 1981; Dantzer et al., 1983). Sick or injured calves should be segregated (AVMA, 1987).

HOUSING

Internal surfaces of barns and holding systems for veal calves should be made of nontoxic materials that either can be cleaned and disinfected effectively or are disposable. Internal surfaces and fittings of houses, stalls, pens, and other equipment accessible to them should have no sharp edges or projections. All floors, particularly slotted ones, should be designed, constructed, and maintained to avoid injury or distress to the calves.

During daylight periods, natural or artificial indoor lighting intensity should be high enough that every housed calf can be seen clearly for inspection at any time by personnel. Dim light conditions promote resting and reduce fly problems (Roy, 1980).

HOLDING SYSTEMS

Calves should be kept in settings conducive to optimal performance, good health, and overall well-being. Several systems satisfy these objectives, but each has certain limitations (Webster et al., 1985a,b; Agriculture Canada, 1988). Veal calves may be raised in either group pens or individual stalls. Holding calves individually makes individual care easier and improves calf health (Parker, 1968; Heard et al., 1972; Linton et al., 1974; Roy, 1980; Andrews and Read, 1983). All holding units should be constructed to allow for proper drainage of waste to keep

calves clean and healthy. Also, stalls should be arranged in rows to facilitate visual inspection of calves.

Individual veal calf stalls in the United States commonly measure .56 to .61 m (22 to 24 in) wide and approximately 1.5 m (60 in) long (Colby et al., 1975). These appear adequate for calves up to 180 kg (400 lb) body weight. For new and renovated facilities, Canadian recommendations are for stalls measuring .65 × 1.65 m (26 × 65 in) for calves weighing up to 202 kg (445 lb) (Agriculture Canada, 1988). Dutch workers have recommended stalls measuring .7 × 1.7 m (27.5 × 67 in) for calves weighing up to 200 kg (440 lb) (van Putten, 1982).

Slotted floors for veal calves should be made of oak or other suitable material and maintained in good repair in order to minimize knee injuries and lameness (Steenkamer, 1982). Slats should be oriented perpendicularly to the dorsal axis of the calf to improve footing and reduce injury. Tethers should be long enough to permit the calves to stand, sleep, and eat, yet be short enough to prevent them from turning around or strangulating. Tethered calves should be monitored at least twice daily, and tether and collar lengths should be adjusted as needed.

In multiple-pen rearing systems, calves usually are kept on solid or slotted floors with bedding; under these conditions, straw is offered ad libitum from a feeder (Bogner, 1982; Steenkamer, 1982). When small groups of calves (e.g., 3 to 5) are kept together, the size of the pen should provide 1.4 to 1.7 m² (15 to 18 ft²) of floor area per calf. Large groups of calves (e.g., 15 to 50) being raised on feeding machines with artificial teats are usually stocked more densely with 1.2 to 1.4 m² (13 to 15 ft²) of area available per calf.

When group pens are used, pen size should be determined by the number of calves, finished market weight of calves, flooring material, and waste-management system. Calves should be grouped according to size to facilitate proper individual milk replacer intake with ad libitum systems (Stephens, 1974). Size of the group may affect the caretaker's ability to detect illness (van Putten, 1982). Veal calves in groups tend to exhibit more variation in growth rate than do calves housed individually (Roy, 1980; Webster and Saville, 1981; Steenkamer, 1982). Even if they are destined to reside in groups eventually, calves may need to be kept in individual accommodations

until at least 1 to 2 mo of age for health reasons (Wood et al., 1967; Roy, 1980; Stephens, 1982; van Putten and Elshof, 1982).

Behavior of veal calves housed under various systems has been studied extensively (Wood et al., 1967; Hafez and Lineweaver, 1968; Bryant, 1972; Stephens, 1974, 1982; Warnick et al., 1976; Roy, 1980; Saville and Webster, 1981; Webster and Saville, 1981; van Putten, 1982; van Putten and Elshof, 1982; Dantzer et al., 1983; Sandhage et al., 1983a,b; Dellmeier et al., 1985; Webster, 1984; Webster et al., 1985a,b, 1986; Winters et al., 1984; and other work cited elsewhere in this chapter). Researchers and teachers using veal calves should become familiar with these research findings. Although some normal behaviors are better satisfied in group pens than in individual stalls, certain abnormal behaviors (e.g., cross-sucking, urine-drinking, and competition for feed) actually may increase.

FEEDING

Veal calves should be fed to meet or exceed the established nutrient requirements for calves (NRC, 1988), except for iron (see Iron section). Typically, in the United States, milk replacers for starting and growing veal calves contain 20 to 24% protein and 16 to 20% fat and are fed for the first 6 to 8 wk. Finisher milk replacers are then fed to provide 16 to 20% protein and 18 to 20% fat until slaughter weight is reached. Vitamins and minerals are supplemented in milk replacers. Amino acids also may be added to the diets.

The protein in milk replacers for veal calves is typically based on milk sources (Warner, 1970; Colby et al., 1975; Roy, 1980; Cunningham and Knesel, 1982). Low quality milk protein or milk protein substitutes may not support top performance in veal calves. Homogenization and addition of emulsifying agents for fats generally improve both the dietary digestibility and the performance of veal calves. Antioxidants should be included in milk replacers (Roy, 1980).

Iron. Hemoglobin concentration in blood varies considerably among calves at birth and calves under iron-supplemented and unsupplemented feeding regimens (Blaxter et al., 1957; Hibbs et al., 1961; Cunningham and Knesel, 1982). Iron available to veal calves in the milk replacer (inherent or added), water, and supplementary sources should be sufficient to maintain the health, performance, and overall well-being of the calves in the production systems in which they reside.

Veal calves fed whole milk or milk replacers unsupplemented with iron will experience declining blood

hemoglobin concentration and changes in other blood traits over time (Niedermeier et al., 1959; Roy et al., 1964; Eeckhout et al., 1969; Warner, 1975; Bremner et al., 1976; Roy, 1980; Reece, 1980, 1984). These trends have not been shown consistently to influence the health and performance of veal calves. Veal calf diets containing 25 to 30 ppm iron or higher at first (e.g., to 4 wk), then <10 ppm thereafter, have been suggested to support a hemoglobin concentration optimal for normal appetite and growth as well as the preferred light color of carcasses (Bremner et al., 1976).

Monitoring of hemoglobin and health of veal calves during the usual growing period will allow the judicious use of supplemental iron.

SANITATION

Performance and health of calves have been related to the interval between successive occupations of calf houses (Roy et al., 1955). The "all-in, all-out" method of occupancy is recommended (Colby et al., 1975; Roy, 1980; Cunningham and Knesel, 1982). Facilities should be steam-cleaned and disinfected between successive groups of calves. With appropriate disinfection, a 2-wk empty period is considered sufficient.

All equipment used for feeding veal calves should be thoroughly cleaned immediately after each use and disinfected daily by heat or with dairy disinfectants approved under milk and dairies regulations. Equipment should be allowed to drain and dry thoroughly between feedings.

HEALTH

Only healthy and vigorous calves that have received colostrum as soon as possible after birth should be purchased. The risk of disease and mortality in veal calves may be related to individual immune status (Gay et al., 1965; Irwin, 1974; Postema and Mol, 1984). However, good husbandry can minimize disease problems even when the calves arrive at the farm carrying infectious disease (Heard et al., 1972; Linton et al., 1974). Calves to be used in research or teaching should appear healthy and be well-coordinated and within the desired range of body weight.

When calves arrive at the barn, each calf's health should be assessed carefully and any necessary treatment regimens started immediately. Navel infection, diarrhea, respiratory problems, and lice are common in newly arrived calves and sometimes follow acute courses resulting in death.

A system of monitoring calves throughout the growing period should be established. Frequent observation is ad-

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visable during the first few weeks after arrival. Any sick or injured calves should be treated immediately or euthanatized.

Animal care personnel should be taught to recognize signs of illness. Typical calf diseases and successful treatment regimens have been described (Colby et al., 1975; Roy, 1980). Calves also should be examined regularly

for external parasites.

Medication and vaccination programs should be used appropriately to reduce the incidence of disease and mortality and to improve calf health and performance. Treatment and vaccination schemes should be based on veterinary advice and experience. Daily records should be kept (e.g., calves treated and treatment) and monitored.

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